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EDUCATIONAL REQUIREMENTS FOR TWENTIETH CENTURY PRACTICE

Who Should Determine Them and How They May Best Be Achieved

The Annual Discourse*

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"Much arises which has already perished and what is now honored is already declining." This aphorism was not penned as applying to the development of the science or the art of medicine, but it very well might have been.

It is, furthermore, a truism, "that few of the problems of human life have, even in details, any particular novelty."[1] We have recently been righteously indignant because certain institutions, licensed to grant degrees in medicine, have been guilty of exercising this right without reference to the qualifications of the applicants. It is on record[2] that this has been done in the case of one or more such institutions, in absentia, for a fee amounting to not more than the annual tuition in many of our Medical Schools, without regard to the previous general education of the candidate, his moral character or his professional attainments. The facts proving the accuracy of these statements were cited, under oath, by the Dean of the Medical School guilty of the offence.

In our own State we have had, for many years, to fight an uphill fight in order to obtain such security as we now enjoy from the improperly qualified practitioner and we are, *even now*, one of only three or four commonwealths where it is legally possible for practitioners of this class to settle, and are obliged to accept the humiliation imposed upon us by such a state of affairs with the best grace we may, because there are enough votes obtainable in our legislature to ensure the persistence of the present situation. In the latter part of the 18th century at two of the most renowned Universities of Europe viz: St. Andrews and Aberdeen, degrees in medicine were granted in absentia upon the recommendation of any two physicians who might be found agreeable to certify that the candidate was qualified to receive the degree of doctor of medicine. The abuse of this privilege became so flagrant that a group of Scottish physicians, headed by William Cullen, a name to conjure with in Scotland, tried to bring about a reform in the practice of those Universities. The authorities appealed to, before they would set in motion machinery necessary to bring about the desired reform, insisted upon securing the opinion of Adam Smith, the distinguished author of the Wealth of Nations, an economist by training and profession. He gave the matter considerable thought, so he says, and wrote a long letter, which appears in McCulloch's edition of the Wealth of Nations as an appendix, and which had the effect, apparently, of deferring for a long time the desirable reforms that were sought by the doctors. When the Carnegie Foundation sought to ascertain the best way to remedy the evils that were only too apparent in the medical educational program of this country, some twenty odd years ago, they entrusted the matter to an investigator who had a brother conspicuous for his scientific researches along medical lines but otherwise no better equipped than was Adam Smith to pass an opinion upon the best method of checking the abuses connected with the granting of degrees in his day. Just as it required a good many years to recover from the effect of Smith's advice in the 18th century so it will require some considerable time to recover our balance after following that of Flexner in the 20th. The conditions which demanded correction at both periods were similar. The advice given was diametrically opposed. Smith said no harm would come to the state from the irregular practitioners and opposed an investigation of the methods of the schools. Flexner, very properly pointing out defects in the system, set in motion corrective machinery which has been so drastic in its effect that it is difficult to keep it in control.

We, as physicians have witnessed extraordinary advances in the sciences at the foundation of our profession. Its art has progressed also but not to the same extent. At the same time in which this progress has been taking place our authority in the community in regard to health matters has fallen off; respect for the Doctor as counsellor and confidant has notably declined as the family physician has been relegated to the background. Cults of various kinds have arisen and gained such following as to seriously compete with the physician in the pursuit of his calling. Social service, contract-practice and many other accessories of our complicated social and industrial life have tended to deprive the Doctor of much of his old time prestige. With a greater degree of general information in possession of the public there has not come a corresponding increase in intelligence, meaning by that an increased ability to make logical use of the greater information which books, newspapers, magazines and other agencies for the diffusion of knowledge have now supplied us. The behaviour of our Massachusetts legislators, for example, who some claim represent a fair cross section of the intelligence of our voting population, bears out this view. They were not sufficiently intelligent e. g., to act upon the vaccination question, justifying their rejection of the bill on the ground that they received more letters from those who were opposed to its enactment than from those in favor of it. If that is to be the method of deciding important questions, and our constitution *compels* us to have a law making body, it would almost seem that it would be better to send those who were *known* to be unfit for *any* sort of work to the State House leaving them to decide *all* proposed legislation on the basis of the epistolary activities of their constituents. I have been coming to the point where I believe that there is not enough of the right kind of "gray matter" in our General Court to intelgently grapple with the subject matter involved in *many* bills that come before it with a public health bearing. Some of those whose votes are invariably on the side of the opposition to public health matters have never progressed intellectually very far beyond the mental status of those who had faith in incantations, rubrics, talismans and all the mysticism of the Shaman or "Medicine Man" of ancient or prehistoric times. We are living in an age of science. The Humanities are being crowded to the wall. Research is the password in Industry, in the study of social and economic questions, in science and in education and the object of it all is to make life's tasks easier, living more comfortable and, if possible, more luxurious. To enjoy the benefits that Science has brought it is but natural that there should have been a trek of the population to urban centers. The census shows that about 47% of the inhabitants of the United States resided in rural communities at the time of the last enumeration. By rural communities were meant towns of twenty-five hundred or less. Decided as has been the tendency for the cities to build up at the expense of the country, the drift of medical graduates to urban communities has been infinitely greater; in one case as high as 95% of the recent graduates of one of our best schools settled in cities and 50% was the lowest percentage of any school studied. Those who have sought to account for the threatened impoverishment of rural communities by this drift of medical graduates into city life, if they are in the position of apologists for the threat, claim that it is either a social or an economic situation in the country that has lured present day graduates away from the country. It is probably true that fewer country bred boys feel that they can afford to spend either the time or the money that a medical education costs in these days as compared with the numbers who did so twenty-five years ago. It is reasonable to suppose that a larger proportion of them would have gone back to their home towns or at least to country practice than would those who were city born. The abandoned farms of New England however would perhaps tell a different story if they could relate what became of their former occupants. They went, many of them, to business success in the cities and larger towns and *never came back* unless after they had "made their pile" and returned to enjoy the quiet of a life, which earlier in their career, was intolerable. So it may not be that the city *trained* doctor, who came originally from the farm, would have done any differently than his city *bred* cousin has done when he has earned his medical diploma.

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The lure of the city for modernly trained graduates of medical schools does not consist in the greater pecuniary rewards to be had. Except in the case of unusual opportunities for assisting some older practitioner it is very doubtful if the net result of the first few years practice is as great in the city as in the country, when the cost of living is taken into consideration. Social opportunity for the young practitioner whether in city or country can scarcely figure for there is no time for it. The real lure is the opportunity to get into special and restricted fields of practice with their greater freedom from confinement—and confinements—its hospital opportunities and laboratory facilities. These are the dominant factors entering into the determination of where a present day graduate in medicine will settle. The Army, Navy and Public Health officers assured Dr. Pusey, in answer to his questionnaire, that they could not obtain young physicians to man their services at any price the Government would pay. Medical work in the public service is general, affording little chance for specialization besides which it is restricted in the amount of clinical material available and the environment in which it must be carried on is frequently undesirable and subject to frequent change. The Government opportunities for research do not appeal to the young graduate as they might were there more posts available in large centers. It would therefore seem that we must look somewhere else for an explanation of the scarcity of physicians to supply the twenty-five or more million inhabitants of this country living in rural surroundings, very many of whom are poorly supplied with medical service for the reason that recent graduates cannot be persuaded to go into the communities where these people live.

Two investigations of this problem have recently been carried out, the results in both being practically the same. In one thirty-four states and in the other thirty-six, replied. According to these replies in more than 90% of the States the older generation of doctors were not being replaced. In one investigation, four states and in the other five, asserted that the supply of doctors was adequate. According to still another study, made in New England, it was shown that the average age of country doctors varies from fifty-two to fifty-seven. This of itself indicates that young men are not coming in to country practice to any considerable extent. In the city of Boston the average age is forty-four.

Pusey[3] in a recent article shows by statistics obtained from 283 counties in 41 States that the the average age is fifty-two and in these 283 counties there are only 398 physicians graduated in the last ten years. In 100 of these 283 (35%) no graduate of the last ten years has gone into practice. To put it in another way only 1.4% of the graduates of the last ten years have settled in these 283 counties. The truth is unescapable that if there is not a radical change brought about in some way these counties are going, in a very short time, to be seriously handicapped for doctors. Because the expectancy of life at fifty-two, of selected risks, as calculated by the life insurance companies, is only 19.4 years, service to the community on this basis can scarcely be greater than ten years. He analyses the situation in the Cleveland district and proves that the Ohio Medical Schools are not producing enough doctors to care for the replacement needs of their district and therefore cannot contribute to the needs in this respect of other states or even the balance of their own state.

The visiting committee of Harvard overseers, making a report upon their study of Harvard's Medical School in 1925 declare that "at least 200 graduates are yearly needed to replace the losses occurring in New England and that it does not appear that Harvard is furnishing its full share of the needed quota." In 1893 there were 160 schools and a population of 85 millions. Now we have only 44% of the producing schools with a population of 115 million and many of the best schools are limiting their numbers while some are doing far worse, they are restricting the numbers taken from any one district. The country boy suffers more in this sort of gerrymander than does the city boy and the country doctor is best recruited from his own people. That from 80-90% of all the sick could be cared for by the general practitioner is a conclusion reached by the Council on Medical Education of the American Medical Association which would seem to show that the country must be over supplied with specialists, at any rate in urban populations. It has been argued that because there is one physician to every seven hundred and twenty-four inhabitants in the United States we are abundantly provided with doctors, but no account is taken in such a consideration for the distribution of these physicians. That they are disproportionately resident in cities has been shown by what has already been stated. Statistics are available to demonstrate that in certain parts of the country a great many confinements were unattended by physicians and that midwives were being employed in increasing numbers. Pusey sees in this situation an argument that may be invoked to force the country into state controlled medicine. He feels that the high cost of medical education is the crux of the situation. The day was when young practitioners were willing to set a low monetary value upon the time they could spare from their efforts to secure a practice in which to teach. Indeed they recognized that they could well afford to do so for in the effort so expended they were perfecting their own grasp of medical problems and such connections were an asset to them in the building of a practice. Such associations would be just as valuable today as they were thirty years ago and the schools could command valuable clinical teachers for an expenditure which would materially lessen the University budget. It is laboratory expense and the high cost of even minor clinical instructors which augments the great cost of the conduct of research and makes the budget of a medical school the highest of all University faculties. A few years ago I was endeavoring to plan the budget in a small department, the department of clinical medicine, whose resources were not limitless and was confronted with the fact that a clinical professor, who was desirable, could not be secured unless he were given nine or ten assistants with the rank of instructor each of whom would demand nine hundred or a thousand dollars. It would appear that that portion of the Aesculapian oath which pledges the physician to impart his knowledge to those who are to be his successors in the art of practice has little force in the twentieth century. For the purpose of visualizing the mounting costs of our medical schools note the statement of Dr. Bevan, the Chairman of the American Medical Association's Council on Medical Education, made in February of this year in his address before the council at Chicago. Briefly it may be stated that his estimate of the cost of a University Medical School, caring for classes of 150 each, including buildings, administration, teaching and research, together with the funds which must be invested to support it, would run from twenty-five to forty millions of dollars. The cost to a University to educate a single doctor is, in some institutions, close to $3000 per annum. At Harvard it cost approximately $2000 per year or $8000 to educate a medical student to the point of graduation. In the overseer's report from the 1925 committee of inspection of this medical school it was stated that the Harvard Medical School costs the community a million dollars annually for the conduct and maintenance of its plant exclusive of what goes into the adjacent Hospitals. Vanderbilt University medical students are educated at an annual cost of about $2000. Society pays from $5000 to $10,000 to produce each of its doctors and the doctors themselves pay an equal amount in addition. Morrison[4] states that on the present basis a medical student might spend from $12,000 to $24,000 for his seven years medical training if he had to cash in for it. On this scale he says the student comes out socially and professionally unfit and the system that creates such a situation bespeaks business unfitness some where in its organization. His remedy is a three year curriculum for general practitioners.

From what has been said it can be readily seen that a medical graduate behaves not unlike any other individual who has his living to make. He considers what it has cost him to procure his education and tries to balance what he has, over against his investment of time and money and the possible opportunities to make the best use of an expensive equipment. Blame can hardly be laid at the door of the young doctor that he shows an unwillingness to go away from the cities. Witherspoon[5] feels that two crises face this country in respect to the supply of physicians: in the first place medical graduates won't go where they are needed and second, if they did they would not be prepared to meet the conditions they will find. He says the "medical education of today unfits men for practice at the bedside." The student is overworked: specialization is encouraged and correlation of the clinical and laboratory courses is needed. He seriously objects to the full time clinical teacher, maintaining there is no place for research in practice and points out that the full time teacher idea did not come from within the profession but was introduced by Flexner who never studied medicine.

Criticism of the curriculum of the modern school is not wanting. The Curriculum Committee of the Association of American Medical Colleges in their report to that Association state that there is a good deal of "forced feeding" in the medical schools and considerable intellectual indigestion results; furthermore students come to the last year of their course "intellectually fagged." Call[6] would institute a campaign to enlighten the public as to their own responsibility in securing what they require from their medical attendants. Emerson summarises the situation by saying that "there are two men to be afraid of in practice viz: the man who judges practice by income and the man who considers every ward case as a laboratory animal." Wilbur[7] maintains that the medical profession has met the problem of medical education by "gorging the curriculum". He declares we have had to absorb the laboratory methods which during the past thirty years have been brought into being and have come to rely upon tests of fluids, secretions, etc., to the exclusion of the study of the patient himself. Medical education has become a pedagogical or University, rather than a professional, affair. We must, he says, continue to regard the human side and not too exclusively the laboratory or scientific side of medicine or we will not carry the public with us. Diagnosis is the great desideratum now, just as in the days of Polypharmacy it was thought there was a certain remedy for every disease. People will naturally turn to those who promise much and pseudo-science, will quite as naturally take precedence over true science in the minds of those who possess a large residuum of superstition, as so many people do. He subscribes to the feeling that the "new practitioner is not as good a doctor as the practitioner trained in the past." Lambert[8], in a review of the progress of medicine since the year 1900 pauses to condemn "full time" clinical teaching. He believes that Medical Education will "recover from the experience and will not be injured by the experiment". As indicating certain defects which he has observed in modern "A" grade schools, he cites his own experience in holding examinations for 35 high grade students, graduated from ten high class medical schools. They were woefully ignorant of therapeutics and gave the impression that they had not been taught to use their five senses but would prefer to work with fifty-five instruments of more or less inaccurate precision. Undue stress is laid upon the laboratory and the study of symptomatology is neglected. He feels that those who taught these recent graduates seriously failed in interpreting the needs of their students. "They were forever hunting the snark and lecturing on the Ichthyosaurus while their pupils were unable to recognize the cimex lectuarius or a common cold." Sir George Makins has somewhere said "the habitual resort to special methods and the belief that complicated apparatus is necessary in the investigation of the ordinary problems of disease, is likely to do as much toward the destruction of the art of the practitioner as the methods of science can do to help it." "Instruction in medicine," Hippocrates[9] pointed out, "is like the culture of the products of the Earth. Our natural disposition is, as it were, the soil; the tenets of our teachers are, as it were, the seeds; instruction in youth is like planting the seed in the ground at the proper season; diligent study is likened to the cultivation of the fields and it is time that imparts strength to all things and brings to maturity." Modern medical clinics call for a staff of specialists to interpret for the chief the tests he orders made. For the student this breeds a lack of dependence upon his own resources in reaching a diagnosis. McCarty[10] raises a question as to whether we have really advanced and made medicine more exact and practical. He enumerates a number of faults in his own medical experience, among which are (1) the fact that we take too long to train practitioners; (2) that our premedical teaching is not good; (3) that premedical courses are too full of unessentials; (4) that medical education is not uniform; (5) that we do not sharply distinguish between practice, research and teaching; (6) that students are too much hospitalized and do not come enough in contact with simple diseases, as they would in dispensary practice.

A satirical criticism of modern medical education appears in one of our journals[11] presented by a prominent medical man who prefers to write anonymously because he is criticising the school from which he was graduated twenty-nine years ago. He summarises his views as follows: "The graduated student in these days has his bag packed full of tricks; his mind is like the pocket of a boy's pants—so full of things, he can't find the bit of string he wants." Compare this with the account of the training of a student at the University of Glasgow[12] ninety years ago. He was prepared in Latin, Greek, arithmetic, French, bookkeeping, reading, writing and grammar. He entered the medical school in 1831 at the age of sixteen, and received the diploma of Master in Surgery in 1834, at the age of nineteen. He studied botany, chemistry, anatomy, surgery, materia medica, midwifery, practice of medicine and "institutions of medicine" and phrenology. After a short residence in Paris where he spent his time in study in the hospitals he devoted some months to taking courses in pathological anatomy and, in 1836 after examination, he took his final degree in medicine at twenty-one. The examination lasted a little less than two hours but he answered 180 questions and read three pages from the Latin of Gregory's Conspectus and wrote a short essay on diabetes.

Marriott[13], who is Dean of the Washington University School of Medicine in St. Louis, remarks that the medical student of today is like the Strassbourg Goose—he is fed continuously and but little attention is paid to what is good for him or what he likes. He has no time to digest it or think about it and when he comes out he is competent for neither research nor practice. He commends the faculty adviser scheme put in practice in some schools as having certain of the advantages of the old preceptorial methods. Courses in medical history he recommends and states his belief that students should be weaned from the thought that a patient is a guinea pig or a test tube. He closes by saying that "our duty (as teachers) has not been fully discharged when we have forced men through an inelastic curriculum in a factory-like manner. Flivvers and sewing machines may be made by such processes but not men."

Flexner[14], returning to the attack, makes comparison of the state of medical education in America after twenty years of the activity of various reformatory efforts and concludes that though there is some reason to be gratified over progress in this country, still it is not what it seems and the really excellent in American Medical Education is exceptional. Though there is some grounds for encouragement there are none for complaisance.

Lorremus[15] regards the rigidity of the curriculum and the inflexibility of the rules of admission as a direct result of the enforcement of the regulations laid down to raise the standards of medical education. There are several good two year schools, i. e., schools having no facilities for carrying on the last two years, who are now confronted with closure because certain schools where their students go for their clinical years are putting clinical work back into the first semester of the second year.

Herringham[16] makes a plea for laying emphasis upon the subject of diagnosis. Though he recognizes the greatly widened field of observation made possible through laboratory methods he insists that even if the horizon may be broadened we do not see objects any more clearly and there is very great liability that the use of the senses and the older instruments of precision may be neglected.

Phillips[17] emphasizes the fact that the physician of the future must be taught more of the art of medicine and not less of its science, though he defines Art as the application of science to practice. He deprecates reduction in the size of classes in medical schools below fifty to the class and in the larger schools urges that greater numbers be taken. An undergraduate school should limit its efforts to the preparation of general practitioners and the training they supply must "smack less of the mechanical, less of the technique of the laboratory and more in the terms of the humanist." He thinks too little emphasis is laid today upon the spiritual and too much on the material. A medical student must be taught to think more in terms of life, health and humanity and less in terms of disease and death. He feels that "the maintenance of individual practice in the person of the general practitioner or family physician is of the utmost importance for the survival and continuance of the family home as the foundation of the nation.'' A great deal of stress is laid in these days upon the importance of research in the medical curriculum. No one can deny, nor should he wish to deny, that discipline in the methods of the scientific approach to the solution of medical problems is desirable for all medical students. It is for that purpose, quite as much as for any specific knowledge or interest they may receive from the pursuit of such studies in themselves, that science courses are offered in the early part of the medical curriculum. If there were time, it doubtless might be well to set every medical student to the task of investigating some problem. Indeed this is done in several schools. In view of the fact that sufficient knowledge of what these principles are may be imparted along with the subject matter taught would seem to show that when the curriculum was already crowded to the limit some better use can be made of the time of the student who is not going into research as a life work.

J. E. Sweet[18] in an address before the Ohio State Medical Society said that the man with a real conception of what medical research is, is the man with the right balance between art and science and that it consists of two things, point of view and time to think. He maintained that all that was needed to restore the general practitioner to his own was a knowledge and belief, on his part, ''that the art of medicine can be practiced even though the science of medicine is not available just around the corner.''

Barker[19] in an address to a group of undergraduates of the University of Pennsylvania in April, 1925, commends the research those students had been doing during their undergraduate course, saying that it had been his experience that those who had had such training under his observation were making excellent teachers, research scholars and practitioners. This is of course probably true, certainly in respect to the two first mentioned, but they are by-products of medical education. General practitioners are, or should be, the main out-put and it was the institution, where he made the above observation, from which in one recent year 95% of its graduates went to the city for their field of labor. Sir James MacKenzie[20], in his book on the Future of Medicine severely criticises American medical teaching on the ground of its laying too much emphasis upon laboratory investigations which are the essentials of most of the research work encouraged for the undergraduates. There is abundant opportunity for a practitioner to carry on *clinical* research all through his life and if he has been properly trained in his student days, he will *do* so in many cases, i. e., he will keep careful records, check up his clinical observations and provide himself with the material for valuable studies and, indeed, make real contributions to the actual practice of the art of medicine, as has so often been done.

The more that specialization is encouraged in the schools the more research will become a part of undergraduate teaching and the more certainly will the schools, whose chief end in life should be the preparation of young men for the problems of general practice, be deserving of the name recently applied to one of them, viz: the ''university of applied biology.'' Such a term may scientifically describe the activities of a modern medical school faculty but its out-put would carry scant comfort to the homes of suffering humanity.

It would make too long a story to trace the curricular changes which have marked this period of 23 or 24 years during which medical education has been *dehumanized*. Suffice it to say that the matters which have been featured have been specialization, full time teaching, research, both as an educational feature in an undergraduate curriculum and as a criterion for the selection of teaching staffs for medical schools and their clinical laboratories,—the Hospitals. After all medical education has not comported itself very differently from general education during this period. In the latter field the call to prepare for vocational demands has taken precedence over the call to ground in the fundamentals of mental discipline, which alone constitutes the essence of a real education. The profession of Pedagogics has been created as a sort of ''holding corporation'' to justify and furnish a refuge for, those desirous of floating questionable educational experiments upon the public. We are turning out from these secondary schools, as a result of this policy, a body of graduates with perhaps a greater store of information than was possessed by graduates of twenty years ago but with no greater ability to make use of this knowledge, if as much, and with scarcely any incentive to culture in its broad sense. Culture, or an appetite for it, and capacity to apply one's mind to any problem constitutes an education whether it be for general or professional application and is what a graduate from a High School ought to possess. Instead of that a majority are ushered forth with a hodge-podge of uncorrelated information and a thirst for the ''flesh pots of Egypt.'' With this preparation and a minimal two year premedical requirement for their professional studies, during which time they are fed up on the scientific discards from the medical curriculum, disgorged by the medical faculty, in order to make room for advanced work in these same laboratory courses, where research is to figure heavily, and the specialties that are multiplying both in number and in the time allotments which they exact from the curriculum committee,—this material presents itself at the doors of our medical schools. They have already had a smattering of science which they have been obliged to take on faith from those who tell them it is essential to an understanding of what they are about to enter upon. The majority of them would like to see a glimmer of the practical application of what they have learned but no, they are inducted into two more years of the same or allied subjects before they really come in contact with a patient. Many of them feel toward the subject as a would be golfer feels toward the teacher who compels him to swing his club over a sand tee, for lesson after lesson, before he allows him to attempt to hit a ball. From the day he enters the medical school until he leaves, the time is fully occupied. If the schedule exhibits an unfilled space the Dean's office blushes for shame and many hours of the time of that official and a curriculum committee is spent in an endeavor to escape such a catastrophe. If the poor student had time to think what was happening perhaps he might be dissatisfied with his lot. It is barely possible that some such idea lurks in the back of the Dean's mind. Be that as it may the result is a plethoric programme which can not possibly be digested and if it were not for an internship, after graduation, many a student, feeling as one does after gormandizing at table, would do as the gourmand does—go to sleep or disgorge. The clinical year saves him and its content should have been served to him, mixed with his theory, far earlier in his course.

It would take too long to point out all of the many ways in which time might be saved in the conduct of courses in the medical schools. In brief, apart from the conduct of the school year on a tri-semester basis (four months to the semester), the principle upon which I am confident it could be accomplished, is the restoration of much of the subject matter taken away from medicine and surgery and allotted to special departments, not necessarily specialties, e. g., haematology and serology from internal medicine or pathology and proctology from surgery. Neurologists have wandered into strange fields lured by the speculation of those who, feeling they are dealing with the occult, regard as legitimate any digression that does not involve a rationalistic, anatomic and physiologic approach to their goal. For practical purposes much time would be saved and thinking clarified if the opposite councils should prevail. Material reduction in the time allotted to undergraduate teaching in throat, nose, ear, eye, orthopaedic surgery and other subjects also, would provide time for allotment to clinical work, preferably in dispensaries, in medicine and surgery, and also for free time to read and think.

The recent translation of Billroth's book on the Medical Sciences in the German Universities, written nearly fifty years ago, contains much that is as true today as when it was written, as Dr. Welch says in his introduction to this translation. "Medical tradition," says Billroth[21], "goes back to the Priests in the temples of Esculapius. Hippocrates clothed it in a scientific form for the Greeks, Galen for the Romans and Avicenna for the Arabs. In the middle ages the Universities elevated these forms to the dignity of dogmas, and these alone were taught at the Universities. Direct transmissions of experience from the practicing physician to the student were excluded from their curricula and not until the middle of the 18th century was it introduced among the medical faculties, at first at Leyden, and usually against the violent opposition of the graduate doctors." Billroth contended that a student could only develop the power to synthesize his observations of disease processes and disease products by observing a master in action. This can only be done effectively by bedside, clinical study. Too exclusive dispensary practice leads to superficiality of thought and hasty diagnosis, though valuable in its way. The so called "institutes of medicine" which we read of so often in accounts of the early schools for the teaching of medicine comprised what was known of the fundamental medical sciences and gave way in the later University developments to the Faculties of Natural Science.

Animal physiology from the time of Avicenna to that of Boorhäve was included in the subject matter of the "Institutes." This comprised anatomy, physiology, pathology and therapeutics. The addition of the sciences of chemistry and physics to the subject matter of the "Institutes," prior to the time of Billroth's activities, had added so much to what a medical student was obliged to know that the same problems presented themselves to his mind as confront us today. "How to provide the means to find enough teachers to keep pace with this enormous expansion of the fields of natural science and of medicine; and secondly how to provide the people with physicians when the study of medicine is so enormously expanded and made correspondingly expensive?" These were the questions which perplexed him in 1884. Much that it was thought necessary to teach then he recognized as obsolete and no longer need be a burden to the students' mind, consequently, he said, "the bulk of what, in a given era, a young physician must know increases very slowly after all and only in relation to the general cultural development of a people." He maintained that the State had a right to demand that the Schools should not increase the volume of knowledge beyond what a young man of average abilities could learn in five years. He urged that secondary education should be given as much attention as that devoted to the expansion of the Universities. Billroth felt that the natural sciences had about reached the limit of their expansion. Instead of that, as we know, they had only just entered upon it. In order to enable the medical student to take full advantage of whatever real advances may, from time to time, be made and at the same time be saved from the danger of becoming a mere repository of scientific observations, the bulk of which have very little or no established, practical application to the art of medicine it would appear that a middle man, so to say, must be introduced between the researcher and the medical schools, whose duty it shall be to determine the values of the researchers' observations and when they have been shown to be bona fide contributions to medical knowledge, let them be handed on to the medical faculties with the stamp of practicability.

No one would doubt that the research department of a corporation, like the General Electric Company for example, would be asked to pass upon the value of any discovery or invention before they would venture to incorporate such a matter into the conduct of their business, however attractive the proposition might appear on the surface or however well recommended it might come. Certainly the reasons they would assign for such an attitude could be no more cogent in the case of an engineering problem than in the case of the diagnosis or treatment of a human being. In no other way can I see a solution of the predicament in which medical schools now find themselves. Such "middle men" are provided for in the Foundations, so liberally established by Rockefeller and Carnegie. The difficulty which has arisen has grown out of the fact that these Foundations have spent such large sums of money outside their own walls, to foster research within the medical schools, that now, to use a homely expression, the "tail wags the dog."

The pedagogic value of research as an undergraduate educational method to be employed in teaching medical students, has not as yet been demonstrated, whatever its graduate educational importance may be. We are groping for ways out of the many perplexing situations which modern conditions have provided and tinkering with the curriculum has, in recent years, been the method most frequently proposed. The latest suggestion comes from the Yale University Medical School[22] where a sort of cafeteria plan has been accepted. The University faculties will offer all the science courses that one may wish—in preparation for medical study and the student may pass along, selecting his courses to suit himself. It is thought that this will make for academic freedom for the faculty and provide a much needed flexibility in the medical curriculum. These various plans have so many objectives, apart from the main one of providing practical training for a practitioner, that the destiny of many may be forecast as the discard and we shall come down to a far simpler program, one which will conform rather more closely, I predict, to that of twenty-five years ago than to any single one which has since been tried out.

Before passing on to a consideration of who shall determine the requirements of medical training it may be well to refer to one of the chief reasons that the medical profession should interest itself in this subject. The growing popularity of the cultists is not based upon the successes of their particular procedures in the treatment of pathological conditions but rather to the blind faith that a very considerable portion of humanity are constitutionally disposed to place in anyone who makes the more extravagant claims of what he is able to do. The high cost of being sick in this day when the doctor calls for all sorts of special examinations and consultations which have to be paid for outside his personal fee, often including a few days' stay in an institution where the studies which modern practice deem indispensable may be carried on, have driven many a heretofore perfectly satisfied patient into the hands of the cultists. He has no need for such examinations and tests; his education has cost him much less so his overhead is lower and as for consultations there is no necessity for the assumption that superior intelligence may reside in any other brain. For such an individual it is easy to promise far more than the conscience of an intelligent and well trained physician will permit him to promise. He knows that failure to make good will be forgotten, and therefore will not hurt, so he may be as extravagant as he pleases. The patient reasons that, economically, the cultist is his best buy for relatively the difference in the results may be very slight. Whoever, therefore, is responsible for introducing into practice the cost-raising features which lead to the diversion of patients to quacks and cultists, without contributing a commensurate practical advantage to the sufferer in a percentage of cases where such service is necessary (10-20%), can be credited with being the cause for the present situation in the practice of medicine. It would appear that the weight of evidence lays this at the doors of the medical schools and those regulative bodies to whose advice the school authorities have listened.

The nursing profession cannot escape some responsibility for the situation for it has virtually abandoned its former attitude toward its work and has become equally dehumanized and commercialized, adding its increment of excessive cost, out of all reason in comparison to the service rendered. The function of the nurse never contemplated anything more than intelligent coöperation with the physician and to that end a far less elaborate educational program than is now thought desirable, would suffice. The more elaborate the training the greater the demand for higher compensations and the greater the dissatisfaction with conditions in practice which deprive them of the facilities to which they were accustomed in training school days.

Having tried to show, from various sources, what many believe *not* to be the educational requirements of twentieth century practice and having made a few suggestions, and cited those of others, as to the ways in which these requirements might be made more conformable to the needs of sick people, in this day and generation, we come to the question who shall determine what these requirements shall be? If the Medical Schools lay down the program it may fall athwart the State Board Regulations of certain states. If the State Societies try to regulate them, through Legislative channels, they are subject to the lobby of second rate schools and cultist societies who declare that the "Poor boy," (ostensibly meaning the financially poor boy but actually meaning, in the majority of cases, the boy who is poor in the qualities that go to make a good doctor,) will have nowhere to go to obtain a medical education, if even reasonably high standards prevail. The Council on Medical Education, the State Boards of Registration and the Association of American Medical Colleges have made the attempt with the result that "too many cooks have spoiled the broth." The real reason for the failure of the latter has been that their Councils were dominated by a sort of Educational Ponzi whose speculative instincts were allowed to run wild. This matter should be regulated within the profession itself. There is no body of men in a better position to know what the health needs of the public are nor should there be any who are more advantageously placed to put a true valuation upon the legitimate advances in medical science. They are the product of the schools, for they are all Alumni of some institution of learning. They should have ideas on the practicability of the courses of study provided by their Alma Mater. It will doubtless be pointed out that the Council on Medical Education of the American Medical Association and the Association of American Medical Colleges are virtually organizations of this character but the former, because of the help tendered by the Foundations, permitted their deliberations to be dominated by medical pedagogues and ultra-radical reformers while the latter, through the preponderance of the same influences which gained ascendancy in Faculty Councils, have lost touch with the "man in the street." The experience of certain large business corporations, whose management has gotten into the hands of a Directorate imbued with a kind of megalophobia of high finance has been repeated. The salvation of such situations in the business world has only been achieved when the stockholders have organized a committee of their own, powerful enough to dominate. It seems to me the time has come when some such action as this is called for in respect to the organization of medical education. The best interests of the Public, who buy our goods, are at stake. The best interests of the Profession who are really stockholders through their investment, evidenced by the Diplomas which they hold, are equally at stake and we should unify the power which common interests give us, to our mutual advantage.

The growing significance of the National Board of Medical Examiners may furnish us a rallying point, for, though maintaining a high standard of excellence for those who are honored with their certificates, they are avoiding the extremes which have been elsewhere demanded. The probable ultimate, general acceptance of their certificates in all states will doubtless eliminate local State Board activities, tending toward that uniformity of standard which is so desirable, and force upon Medical Schools a curricular modification which will also call for uniformity of content. Some time ago I made the suggestion before a joint meeting of the Middlesex and Essex District Societies that it might be well for the District Societies to have committees that should try to create local enthusiasm in the problems of medical education. I believe such committees could do a great deal of good for I am sure they would be able to exert an influence at the fountain heads of medical education which would be constructive as well as neutralize certain of the ill effects which grow out of a type of training which does not recognize, any more than does our present one, the practical needs of the public. We have all, as we look back over the years we have been out of the schools, seen many experiments tried in medical education which have passed from the boards entirely. Just now the distinguishing feature, which is being honored, viz: research, is manifesting symptoms of a decline. It is high time a contribution which shall be more permanent, be added, though it is probable that whateyer it may be someone will discover it is only a reincarnation.

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NEW ENGLAND SURGICAL SOCIETY

THE VALUE OF IODINE IN THE SURGICAL TREATMENT OF EXOPHTHALMIC GOITRE*

BY EDWARD P. RICHARDSON, M.D., F.A.C.S.

THE effect of iodine in modifying the course of exophthalmic goitre, an advance which we owe to Plummer, has been abundantly confirmed by observers following series of cases of this type, in particular by Segal, Starr and Means[1], Cowell and Mellanby[2], Fraser[3], and Jackson[4]. Although isolated instances of the benefit of iodine in exophthalmic goitre have appeared in the literature, they were completely overshadowed by the evil effect of iodine in causing the development of toxic symptoms in cases of adenomatous goitre, a dangerous possibility clearly pointed out by Kocher[5]. More recently Neisser[6] showed the clinical value of small doses of iodine in exophthalmic goitre, results confirmed by Loewy and Zondek[7] through determinations of the basal metabolism in three cases and by observations in nine more. However, the conditions of the value of iodine in treatment were not clearly defined. In order that the action of iodine might be noted and made useful, it was necessary in the first place that the forms of goitre causing hyperthyroidism should be accurately distinguished. Plummer, therefore has performed a double service, the clear separation of two types of goitre with toxicity, exophthalmic goitre and adenomatous goitre with hyperthyroidism in 1913[8], and a demonstration in 1923[9] of the value and method of use of iodine in exophthalmic goitre, with due allowance for the possible harm or lack of effect of iodine in adenomatous goitre.

While the activity of iodine as a therapeutic agent has been definitely proved, its value in the surgical treatment of exophthalmic goitre, conditions and limitations of its use, as well as the possibility of certain harmful effects if indiscriminately applied may still be emphasized. For this purpose I have taken a small series of cases of exophthalmic goitre operated on by me and followed in the Thyroid Clinic at the Massachusetts General Hospital.

In general the use of iodine in exophthalmic goitre has the following temporary effect. Within a day or two after its administration a lessening of the patient's restlessness and emotional instability occurs. The pulse slows and the metabolic rate falls, these changes usually being obvious within three days and reaching a maximum within eight to fourteen days. The flushing of the skin and the stare characteristic of the disease diminish. Coincidentally the patient recognizes a definite symptomatic improvement, a diminution of nervous tension, a quieting of the heart action, and an increased sense of well-being. The reality of the improvement is shown by a tendency to gain in weight. If the patient is in an acute toxic "crisis," such as formerly often proved fatal, the vomiting and diarrhoea cease, other symptoms are relieved, and a definite remission is instituted.

The degree of benefit obtained by iodine varies in different individuals. In some cases the basal metabolic rate drops to within normal limits; more frequently it persists at a moderate elevation. In general we may say that somewhat less than half the cases show a marked remission, another third show definite improvement, while in the remainder the effect is slight or absent. Apparently no cases are made worse during the short period of treatment recommended.

Accompanying the administration of iodine Cattell[10] has shown a change in the histological picture of the thyroid, characterized by a remission of hyperplastic changes and a return toward a colloid or resting state, and also by analysis an increase in the iodine content of the gland.

The improvement produced by the iodine is unfortunately only temporary. If the drug is continued the pulse and metabolism gradually rise after the maximum drop and the symptoms of the disease increase again. Even if the use of iodine is kept up for many months, the disease remains active, although there may be gain in weight and improvement of general condition. If the iodine is omitted, the symptoms rapidly recrudesce and the patient may be worse off than before the iodine was given. This is a point of great importance in treatment since it means that with the use of iodine we have introduced a factor the final effect of which cannot be predicted, and therefore such cases should be closely followed until positive cure is obtained.

From what has been said, it should be clear that the use of iodine is not a satisfactory medical treatment for exophthalmic goitre. There is little advantage in producing a temporary improvement in the course of the disease, unless this benefit can be maintained. However, by producing a remission we can create a favorable opportunity for operation, particularly since a postoperative toxic reaction of the type formerly so dangerous in this disease rarely occurs after a careful preparation with iodine. Operation is thereby made safer and fewer operations are necessary to complete the removal of an adequate amount of thyroid tissue.

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*Read at the annual meeting, October 2 and 3, 1925.

If the temporary effect of iodine which is so valuable in the surgery of exophthalmic goitre should lead to the indiscriminate use of iodine in patients with enlarged thyroids, harm rather than good will be done by it. The chief danger and a very real one is that adenomatous or nodular goitre may be stimulated to toxic activity, and so produce organic damage and increased operative risk. In patients with atypical exophthalmic goitre the diagnosis may be obscured, through improvement in general condition, and lowering of metabolic rate, and so may only be established after omission of iodine for some weeks. Further, if given to patients with definite exophthalmic goitre, the period of maximal remission may be lost, and operation may have to be undertaken after the disease has begun to recrudesce. When iodine has once been given, the effect of its withdrawal cannot be predicted and thus serious toxicity may develop if the patient passes out of observation. Finally, the surgeon should have an opportunity to see patients both before and after iodine is given so that he can judge more accurately the severity of the case, and the extent of operation advisable. If he sees the patient only after an iodine effect has been obtained he may be led to undertake a too extensive operation.

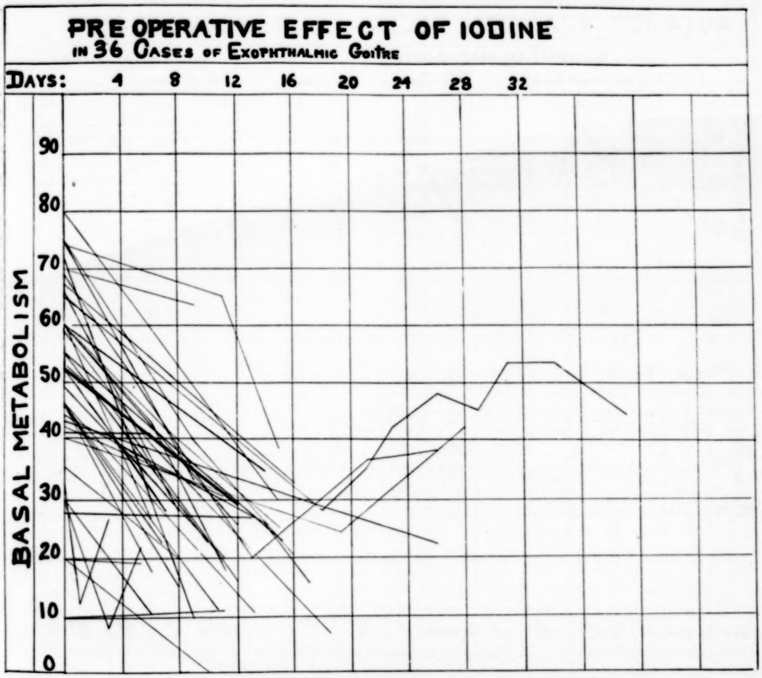

CHART I

The lighter black lines represent the variations in metabolism of individual cases. The heavy line shows the average fall in metabolism for this group.

However valuable a minimal dose of iodine may be in preventing goitres in children of school age in regions where goître is endemic, iodine should not be given to adults with enlarged thyroids except under certain definite conditions. The most important preliminary is an accurate diagnosis of the type of goitre present in the individual case. If it should be exophthalmic goitre, iodine treatment should be begun only after complete study as a definite part of the preoperative treatment.

Since June 1923, iodine has been given at the Massachusetts General Hospital in this way, as a preliminary to operation. The patients are admitted to the medical wards for study after which iodine is given as Lugol's solution, usually in a dosage of from 15 to 30 minims daily. Operation is undertaken when the maximum iodine effect is believed to be obtained. Chart I shows the effect on the basal metabolic rate actually secured by this preliminary treatment in a series of consecutive cases. It is not an accurate study of the iodine effect alone, since in some cases there is a rest factor, while a few others had previously received iodine, but it serves to show the results likely to be secured in actual practice. The general downward tendency of the metabolic rate is clear; the average result, shown by the heavy line, is a drop from plus 52 to plus 29 in an average of 12 days. In these cases the clinical improvement and drop in pulse were as striking as the fall in the metabolic rate. It should be noted that in three cases in which operation was delayed, and the drug was continued over 16 days, the metabolism began to rise again, showing that the time of maximum effect had passed.

Reduction of the basal metabolism, and of the pulse rate which parallels it, would be of relatively slight importance if this were all. But in addition, the reaction to operation is modified by iodine. The restlessness and nervousness after operation, formerly so common and so difficult to deal with, rarely occur. The patients are ordinarily calm and quiet, or readily controlled with sedatives. The tendency from the time of completion of the operation is toward improvement, whereas formerly patients after reaching bed in good condition might pass after a few hours into a state of extreme toxemia.

But iodine does not convert patients with exophthalmic goitre into normal operative risks. As a means of showing this visually the average postoperative reaction in three groups of cases as shown by the pulse and temperature has been charted during the first 72 hours.

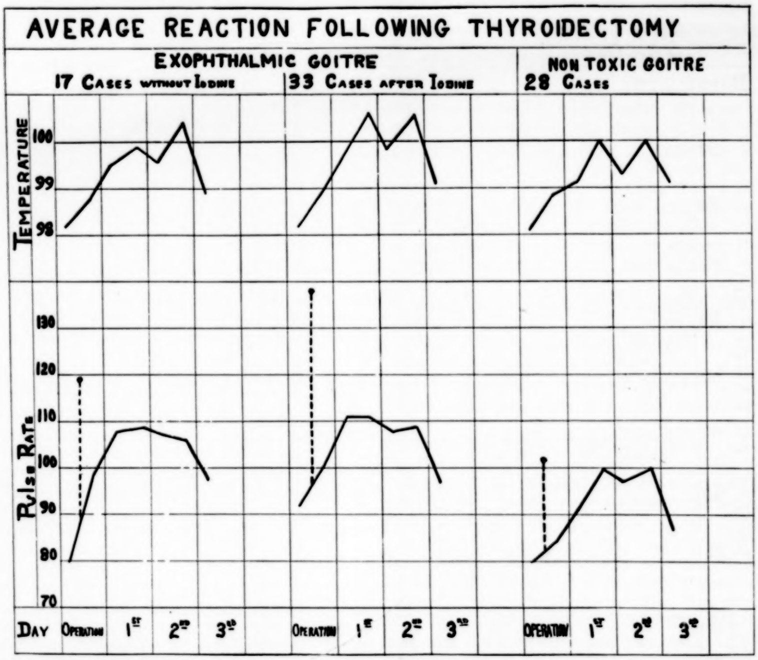

CHART II

The curves show the average temperature and pulse of the three groups of cases. The dotted line shows the average maximum pulse occurring at any time during anaesthesia and operation.

Since the anaesthesia, technique and operator were the same the groups are directly comparable. The first group consists of exophthalmic goitre, either mild in type or prepared by ligation or Roentgen-Ray, in which no iodine was given. The second group of much greater average severity before treatment are cases of exophthalmic goitre prepared by iodine. The third group are non toxic goitres. The average postoperative reaction in both groups of cases of exophthalmic goitre as shown on the chart is very similar and distinctly greater than in non toxic goitres. It should be noted, however, that the maximum average pulse rate during operation is highest in the cases prepared by iodine. This in itself is perhaps not of great significance, and probably occurred because the disease was more severe in these cases, but it is surely a point in evidence that these patients even with iodine do not react to operation like normal individuals.

A much more important, though intangible, factor is the impression given by these patients during and after operation. While only one severe, though not alarming, postoperative reaction has occurred among sixty patients prepared by iodine, yet one has the feeling that as well as being sensitive to operative trauma and to complications, a fatal result through a toxic reaction may well be brought on by over-operating in the wrong case. I should like to emphasize that although iodine in preparation represents a great step in advance in the surgical treatment of these cases of exophthalmic goitre, it has not converted them into patients with normal resistance. It still is necessary to judge carefully the seriousness of the individual case, and to divide when necessary the operation of subtotal thyroidectomy into two or more stages. There is a distinct danger that because iodine is a good thing, it will be too much relied upon and its benefit exaggerated.

Two deaths which occurred in this series have no direct bearing on the efficiency of iodine in preparation for operation. One woman of 38 with a moderately severe exophthalmic goitre and chronic lues died on the 7th day during a severe tetanic spasm. The second death occurred in a woman of 27 with a very mild hyperthyroidism, and a preoperative basal metabolism of plus 5, following the use of iodine. Operation was postponed on account of a laryngitis. Following a simple thyroidectomy the pulse never rose above 120, or the temperature above 99, but there was more nausea and restlessness than usual. During the second night, when apparently in good condition, without respiratory obstruction or signs of tetany, there was a sudden development of restlessness and apprehension following which the lungs rapidly filled with mucus and she died. The cause of death in this case was uncertain. It was clearly not the usual toxic reaction, nor was it pneumonia. The possibility of a hypoglycemic reaction was unfortunately not excluded.

Chart III shows how much more frequently operation has been done in one stage since iodine has been used. The percentage of immediate subtotal thyroidectomies has increased from 19.5% in the earlier series to 92% in the cases following iodine. This increased extent of operating has been accompanied by reduction in the severity of the postoperative reaction. Thus of the three deaths in the earlier series, which occurred during the first twelve cases, two were due to toxemia from over-operating, while the third was a sudden death on the operating table possibly due to air embolism. The two deaths after administration of iodine cannot be considered arguments against its effectiveness in preventing postoperative toxemia. The use of iodine had led to great benefit to patients through the economy of time and lessened suffering, as well as through more rapid detoxication, and the more radical attack made possible through its use is justified. There seems to me no question that one great danger in the surgery of exophthalmic goitre has been in great part eliminated.

CHART III

EXOPHTHALMIC GOITRE

CHART SHOWING TOTAL NUMBER OF OPERATIONS, AND PERCENTAGE OF COMPLETE PRIMARY OPERATIONS, BEFORE AND AFTER THE USE OF IODINE

	Before use of iodine		After use of iodine	
Total cases operated on	46		61	
Operations	Number	Deaths	Number	Deaths
Single ligations	39	0	4	0
Double ligations	6	0	0	0
Hemithyroidectomy	36	3	6	0
Immediate subtotal	9	0	56	2
Delayed subtotal	10	0	1	0
Preliminary incision	1	0	0	0
Delayed closure	0	0	1	0
	101	3	68	2
Surgery unfinished cases	4		1	
Operations per case	2.2		1.12	
Immediate subtotal thyroidectomy %	19.5%		92%	

Since symptoms of toxicity recur rapidly when iodine is withdrawn, it is important that it should be continued during the postoperative period. Our custom is to give 60 minims of Lugol's solution by rectum in tap water during the first twenty-four hours, and to continue with 30 minims daily by mouth until discharge.

Patients in whom a preliminary or partial operation has been performed required careful supervision until thyroidectomy is completed. A withdrawal of iodine before this period may lead to serious consequences. This is shown in one of the only two cases in which ligation of the superior thyroid arteries was done. The case referred to was a rather precocious girl of twelve years, who had a severe exophthalmic goitre, with a metabolism of plus 62, which under rest and iodine came down to plus 30. After ligation of the superior thyroid arteries in two stages, further clinical improvement occurred, and the patient was discharged with direction to return for observation. The symptoms returned with severity and the mother, although urged, did not bring the patient back to the hospital. The disease progressed and death occurred two months after discharge. Such a patient should be kept under iodine and in the hospital until thyroidectomy is completed. This procedure was followed in a second patient, a doubtful case, in whom ligations were done in part as a therapeutic test and in part to get a microscopic section from the gland.

The value of ligation of the thyroid arteries as a therapeutic procedure has been distinctly modified by the use of iodine. My feeling is that the effect of iodine is so great and of ligation relatively so small, that this stage in surgical treatment can well be omitted, except as a test of resistance to operation. If surgery can be undertaken at all, I should feel it desirable to attack the thyroid directly, and perform a partial removal of one lobe, either in one stage or after preliminary reflection of skin flaps. After recovery from such a hemithyroidectomy, the patient should continue iodine in a dosage of about 15 minims of Lugol's solution daily, under close observation, until the second lobe is removed.

Should iodine be continued after surgical treatment is entirely completed and the patient leaves the hospital? Shortly after a routine preparation with iodine was instituted it was noted that occasional patients discharged following subtotal thyroidectomy with a metabolism normal or slightly below, showed a rise at the end of a month or six weeks to plus 20 or plus 30. Since such a temporary rise rarely occurred in patients previously, whose metabolissm either came to normal, or remained elevated through insufficient removal of gland tissue, it was thought to be due to omission of the drug. For this reason patients have been discharged with directions to take 5 minims of Lugol's solution daily every other week during the first two months. On this regime such a rise has been much less frequent, and there has been a greater tendency for the metabolism to remain slightly subnormal for a time although clinical myedema has not occurred. This rise in metabolism is perhaps not important, but may lead the surgeon to believe that his removal of thyroid tissue has been insufficient. At any rate it would seem logical to continue for some time after operation a small iodine dosage in order that the thyroid may remain in a relatively inactive state and to avoid any theoretical possibility of the thyroid continuing to form a secretion abnormal in type through iodine deficiency.

The surgical treatment of exophthalmic goitre has been profoundly influenced by the use of iodine before and after operation. Anxiety in regard to postoperative toxic reaction and the necessity for frequent resort to multiple stage operations have been largely done away with. As a result of this advance, preparation with iodine and surgery is the routine method of treatment in this clinic. The Roentgen-Ray is used only under exceptional conditions or where operation is refused. But I wish to emphasize two possibilities of harm from the use of Lugol's solution. The first lies in the indiscriminate giving of iodine to patients with enlarged thyroids. The second is that operators may be led to believe that preliminary use of iodine has solved the problem so that cases of exophthalmic goitre may be treated with as little respect as an ordinary neck dissection. Although iodine has contributed greatly to the safety of operative procedures, this is far from the case. There is still the necessity for careful selection and preparation of cases, and for a conservative estimate of how much surgery a given patient may stand.

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Discussion of Dr. Richardson's Paper

BY DR. FRANK H. LAHEY, BOSTON

Iodine was originally introduced by Marine in 1911, who demonstrated the reversion of hyperplastic thyroid tissue to the resting type. This was based upon observations in animals and humans. Nizer in 1920 reported eight typical cases using iodide of potassium. In our Clinic we have applied Lugol's Solution to two hundred cases and out of this group sixty-nine cases have been studied in a detailed way. These cases were selected because they were all cases of severe primary hyperthyroidism, because none of the patients had had iodine before coming to the Clinic, and because all received iodine and were carefully followed by metabolic studies before and after operation.

In addition to this, histological studies have been made in the Clinic by Dr. R. B. Cattell to demonstrate (1) the change in the histological picture, and (2) the change in the milligrams of iodine per gram of dried gland. Of the sixty-nine cases, all but 7.2% showed an appreciable drop in metabolic rate after Lugol's Solution and rest. Of all of the cases of primary hyperthyroidism receiving iodine and studied by histological section, 87.9% showed involutional changes, 6.7% in spite of iodine showed an increasing hyperplasia.

Cattell has shown, as was previously demonstrated by Marine, that the milligrams of iodine per gram of dried gland is in inverse proportion to the degree of hyperplasia.

There has been a decided alteration in our Clinic since the administration of Lugol's Solution has been made use of. Before the use of this solution and rest in bed was employed, only 38% of the cases were operated upon in one stage. During the past year out of seven hundred and fifty-four thyroid operations but one pole ligation was done and six hundred and eighty in one stage and seventy-four were done in more than one stage. It has been demonstrated to us beyond any doubt that the involutional changes, as shown in the histological picture, do not go hand and hand with the functional gland following the administration of iodine. We have seen a great many cases in which the histological picture is that of a resting thyroid, yet the metabolic rate remains elevated, the pulse rapid and evidence of active and persisting hyperthyroidism obviously present. We have not been able to cure any cases solely by the administration of iodine. Occasionally we have left too much thyroid, resulting in a persisting thyroidism. In these cases, operation is difficult and we would very much like, if it is possible, to get them well without surgery. The prolonged administration of iodine has failed in every one of these cases to bring about a cure and all have required re-operation.

We have further found that the degree of lowering of metabolic rate following the administration of iodine is no criterion of operability. We have repeatedly seen patients so improved by the administration of iodine that they appear to be very excellent operative risks, only to react in a stormy way to limited thyroid procedure such as hemithyroidectomy. We, therefore, are definitely convinced that when determining the degree of operability, one should have in mind not how the patient is after iodine has been administered but how she was before it was administered and based upon this a conservative procedure undertaken.

We have submitted eighty cases to the so-called Rabinovitz Solution. Rabinovitz has shown that tissues have a varying affinity for iodine in various combinations and that thyroid tissue had a particular affinity for iodine in syrup of hydriodic acid. We have submitted cases to treatment with this solution in doses of twenty drops. We have no exact data on these cases as yet, but it is the impression of Dr. Mason, who has charge of the administration of iodine, that the iodine effect takes place earlier than with Lugol's Solution, and that in general the effect of iodine is more pronounced with this solution than with Lugol's Solution.

There is one important point which we would particularly like to stress. We practically never receive cases into the Clinic today that have not had iodine, and the promiscuous use of iodine results not only at times in diagnostic confusion but it is also at times distinctly dangerous. We feel sure we are seeing more and more adenomatous goitres, probably made toxic from iodine having been promiscuously prescribed by physicians. I say promiscuously indicating that the type of goitre had not been determined before advising the use of iodine. I would like to make it very clear that the administration of iodine in adenomatous goiters is distinctly dangerous.

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ORIGINAL ARTICLE

A RARE TUMOR OF THE LIVER WITH METASTASES IN THE HEART AND PERITONEUM*

BY STAFFORD L. WARREN, M.D.

THIS case is of interest to the clinician and to the pathologist. To the former because the clinical diagnosis, after an apparently thorough study, was "psychoneurosis," until it was pointed out that the history was inconsistent with such a diagnosis. After much discussion a biopsy was done on a small skin nodule, very little different from a fibroma, and the solution obtained. The case otherwise would have remained a complete puzzle for at least four months more.

To the pathologist the tumor cells present an atypical picture of rapidly-growing cells, which at present defy classification. Their exact prototype cannot be found either in the text books on pathology or in the necropsy files among other hemangiomata or similar tumors of the liver. The metastases are also unusual.

The patient, Mr. A. G., W. M. No. 261544, a white man of 53, entered the ward on Feb. 25, 1924, complaining of sharp pain (of several months duration) in the anterior axillary region, just above the right costal margin. This was made worse by deep respiration or lifting. It was especially troublesome if cold air struck him or he became chilled. Fourteen months ago, the patient had a dull aching pain in the right lower quadrant without other manifestation. Gastro-intestinal X-ray examination at this time was negative. The pain disappeared gradually. Three months ago an upper respiratory infection with fever and cough left him debilitated. One month ago the joints became painful, without other symptoms except fever for a week; complete recovery occurred in three weeks. Ten days ago, the pain complained of, was aggravated by additional pain in the epigastrium. There has been a loss of 10-12 lbs. weight in last three weeks.

The family and past history are of no importance. The patient was nervous and irritable and cried during taking of history. He was always well all his life, and had no history of "nervous breakdowns."

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On physical examination was found a well-developed and nourished middle-aged man not acutely ill. Dental caries, moderate pyorrhea, and tonsillar tags were present. The cervical, axillary and inguinal lymph-nodes were palpable as small, firm, discrete nodules. Chest: The veins were slightly more prominent than usual and a faintly visible band of dilated venules was present at diphragmatic attachments. The heart showed nothing abnormal. In the lungs a few moist râles were found at both bases posteriorly and some changes in bronchial breath sounds at the hilus. The abdomen was soft and not remarkable. No tender areas were noted. The liver and spleen were not palpable. The brachial and radial arteries were palpable and slightly tortuous. The blood pressure was 140/80. External hemorrhoids were present. There was a very slight kyphosis. The areas in which the pain was complained of were only slightly hypersensitive to touch.

The impression on admission was: "Chronic pulmonary infection probably with bronchiectasis. Gall-bladder disease cannot be excluded." Repeated examinations during the next ten days brought to light little except that the findings and history were not consistent with any diagnosis. The temperature varied from 96 to 99.5 F. with two unexplained elevations to 101.5 F. There was marked anorexia and a steady loss of weight from 165 to 161 lbs.

Laboratory Work: The study of the blood cells, blood chemistry, urine, stools, spinal fluid, sputum, and stomach analysis, were within normal limits. Examination, by the X-ray, revealed only pyorrhea, and some hypertrophic arthritis of the spine. No gall-stones were seen. There was no evidence of disease in the lungs.

The case was reviewed, before discharge, by the Visiting Physician, who pointed out several small nodules in the skin. These had previously been taken for fibromyomata of the skin. The Visiting Physician made the following note: "Believe biopsy advisable. Taking everything into consideration in this case, history is more suggestive of 'something' in region of right kidney. Hypernephroma or lymphoma must be considered. There are three nodules in the skin—one in front of right shoulder, one in right flank, and one just to left of umbilicus. These feel like metastatic nodules." He emphasized the fact that while the patient was obviously neurotic now, he was so from some chronic debilitating process. Furthermore his background was not that of a psychoneurotic, as he had always been well, had rarely sought medical advice, and had never had a nervous breakdown. His present emotional irritability was of recent origin.

The biopsy report by Dr. H. F. Hartwell was as follows:

24-3-31 "Two small fragments composed largely of fat, with small purplish-red nodules in their centres. Microscopic examination of both of these nodules shows large, irregular spaces filled with medium-sized atypical cells. These cells have basophilic cytoplasm with large hyperchromatic nuclei, and are mixed with red cells. Clusters of these tumor cells lie in the fat and fibrous tissue. The fibrous stroma also contains small, irregular blood-vessels lined by several layers of endothelial cells, which are smaller and less atypical than those filling the large spaces. These vessels are probably a part of the new growth. The histologic appearances are those of a malignant blood-vessel tumor. Angiosarcoma."

The patient was given some radiation (both radium and X-ray) over all the nodules noted, even though they were very small. As the site of the primary growth was not known, he was discharged, on March 15, without further treatment.

The following resume of the course of the next six weeks was received from his physician, Dr. Hollis G. Batchelder, who very kindly obtained permission for the necropsy.

After the patient returned from the hospital, "he continued about the same until April 14, when he suddenly lost the use of his limbs and control of his sphincter muscles. He also lost all cutaneous sensation below the umbilicus. He continued to suffer intense pain through the upper abdomen, chest, arms, and neck. Many sarcomatous nodules, from the size of a split pea to that of a hazel nut, appeared. Pains seemed to radiate from these, particularly from the larger ones. It was necessary to catheterize twice daily up to May 17, from that time on his urine leaked away constantly. About the time of the paralysis until the middle of May, he took very little nourishment. It required three grains of morphia daily, to keep him in any way comfortable. In the middle of May he suddenly developed unusual appetite, which lasted for only a few days. He then commenced to grow gradually weaker. His pains became less severe, so that for several days prior to his death, he required no morphine. His mind kept wonderfully clear, until about two weeks before he died."

Necropsy showed the body of an emaciated white man, with large decubiti over the sacrum, most of the spinous processes of the vertebrae, the heels, and the ankles, with erosion and destruction of part of the sacrum and coccyx. There was some edema at the bases of both lungs. There was also a chronic and a subacute cystitis.

Except for the presence of the metastatic nodules which had caused some compression of the tissues immediately surrounding them, the remainder of the organs were normal. The tumor had nowhere infiltrated tissues. The brain and spinal cord were not abnormal and no cause for the paralysis could be found. The largest single tumor mass was in the liver, and this would seem to be the primary source of the metastases. The liver weighed 2,000 grams and did not seem enlarged or abnormal except for the area of compression around the tumor mass. This mass (Figure 1) occupied about one-third of the anterior surface of the right lobe of the liver, and had a dome-like surface extending one-half to one cm. above the surface of the liver and involving an area about 5x9 cm. in diameter. It extended to within 2 cm. of the lower edge of the liver, which was located at the costal margin. It was firm, giving the impression of fluid under tension. Cross-section of the greatest diameter disclosed a multilocular tumor sharply limited by a thick capsule (Figure 1). The content of the cyst was soft, almost jelly-like, dark black to bright red in color and seemed cellular in nature. It resembled hyperplastic bone-marrow. Scraping the cut surfaces emptied the individual loculi almost completely, leaving a thin, irregular, rough surface of the more solid part of the cellular mass, clinging to the capsule walls. This material did not seem to contain clotted blood or coagulated material but to be made up of cells with little connective tissue stroma.

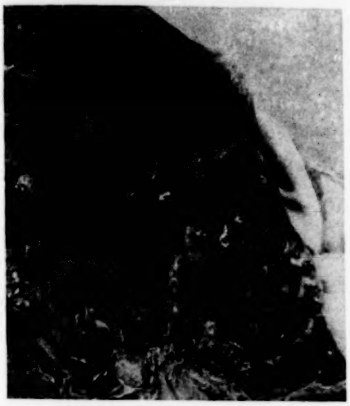


FIG. 1. Close-up of cut section of tumor in the liver, showing capsule and the soft cellular material it contains. Much of the contents of the smaller loculi have been lost in the handling.

The next largest tumor mass was found upon the anterior surface of the spine beneath the pleura, extending over the bodies of the 3-5 dorsal vertebrae on their ventral and lateral aspects out to the right and over the 2d and 3d ribs. It did not infiltrate the bone and could be pried from it readily with capsule intact. The blood-vessels in this region were more numerous, and the bones were cut more readily. There is no apparent pressure on the cord in this region. Section of this tumor mass disclosed much more connective tissue, than in any other of the tumor masses. It was firmer, the red areas were not so easily scraped out, and the capsule was everywhere thicker.

Large globular masses of the tumor involved the left 9th rib and its costochrondrial junction with erosion of the bone. This measured 3x5 cm. and contained red jelly-like material on section. The rib fractured easily at this point.

The metastases elsewhere seemed to be of two regular sizes. They were all globules of a diameter either of 1 and 1½ cm. or 2-2½ cm. About 20 of these were distributed over the peritoneal surfaces of the intestines (Figure 4) at their mesenteric attachments, and to the epiploicae, where they hung from small pedicles. One of the larger size was located at the common duct, 7 cm. from the papilla of Vater without obstruction, one in the tail of the pancreas, one in the spleen, one in the cortex of the lower pole of the left kidney and also in the connective tissue of the pelvis of the same kidney, 6-8 in the mediastinal tissues in various places, and three were situated on the anterior surface of the right ventricle (1 large and 2 smaller ones) Figure 3, two upon the left ventricle (Figure 2) and one at the anterior junction between the right and left ventricles. A small one projected into the right ventricle from the myocardium at the base of the tricuspid valve. The endocardium and pericardium and the valves were intact. Several axillary and cervical masses were found which seemed independent of lymph-tissue, although in the midst of lymph nodes. The mesenteric

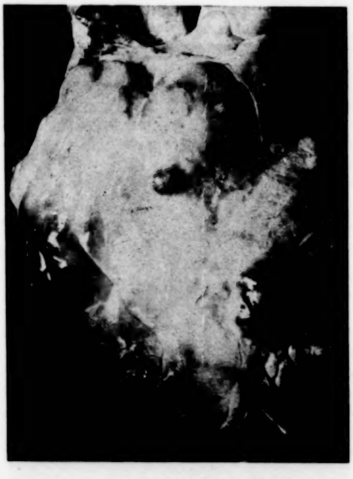


FIG. 2. One large and two small metastases into the myocardium just beneath the pericardium of the left ventricle.

lymph nodes, those at the hilus of the liver, and the mediastinal lymph nodes were free of tumor involvement. There were two small skin nodules or metastases over the abdomen besides the one removed for biopsy.

There was little abnormal histologically, except for the presence of the tumor nodules in the heart, liver, spleen, and kidney. A moderate amount of chronic passive congestion was present in the spleen. A small amount of fat necrosis was seen in the liver. The lungs showed a slight amount of emphysema. There was no pyelitis.

Microscopic section of one of the globular masses about ½ cm. in diameter showed a capsule made up of 2-4 layers of connective tissue cells with an occasional single strand branching off to the main mass of tumor cells within. The cells within the capsule were held together by infrequent single strands of connective tissue and many blood-vessels of all sizes and of marked tortuosity. The blood-vessels were thin-walled, consisting entirely of a single thin endothelial cell and no smooth musculature or other supporting structure. Occasionally tumor cells group themselves regularly around a blood-vessel giving the appearance much like that of a tubule of the kidney, but there was always a thin layer of endothelium inside this, between the tumor cells and the blood-stream. Nowhere have the tumor cells formed the blood-vessel walls without the lining of endothelium. Except for somewhat irregular grouping around the blood-vessels the tumor cells had no definite configuration.

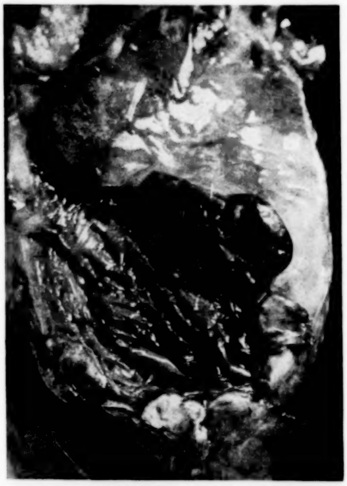


FIG. 3. Cut section through two large nodules in the wall of the right ventricle.

The tumor cells were large and showed many mitotic figures. Two nuclei in a cell were very common. The nuclei tended to be ovoid, stain lightly, and contained little densely staining nuclear material. One or two nucleoli were usually present. The nuclei were about three times the size of the white blood cells in the vessels. The cytoplasm varied from 2-4 times the size of the nucleus, i. e., the cell could have held from 6 to 12 w. b. c. The cytoplasm was clear and stained lightly with eosin. The tumor cells grew in huge, irregular groups and seemed connected with each other by thin protoplasmic processes or fibrils. There were occasional phagocytes filled with hemoglobin just beneath the capsule and nearby capillaries. There were no red blood cells free in the tumor mass. There is in some of the metastic areas, a tendency to signet-ring formation, with one cell around a large cell with a definite space between them. (Figure 5.) The inside cells did not seem to be phagocytized. Both cells were definitely tumor cells. In some places the nucleus of the outer cell was apparently on edge, the cell resembling an endothelial cell. Occasionally a large tumor cell with a single large nucleus may have two other cells smaller than the average-sized tumor cells, inside of it. In some cases three or four cells resembled petrie dishes, nested somewhat eccentrically, and the larger outer cells having a protoplasmic process around the others. This was most striking in the kidney metastasis, in which the cells were very large and pale and seemed more rapidly growing than in the peritoneal metastases (Figure 5). Frequently large cells with one or two nuclei had large spaces in them like large vacuoles except that the spaces had definite cell membranes as if they had accomodated cells therein.

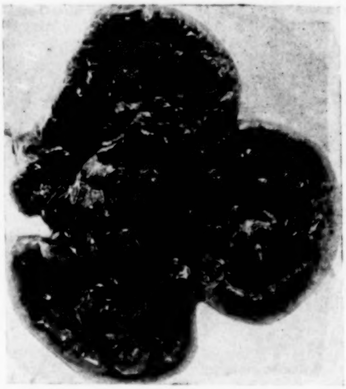


FIG. 4. Metastases in the mesentery along the attachments to the intestine.

In the specimen from the ventral surface of the spine the connective tissue stroma was very much more prominent and the tumor cells were smaller, the nuclei staining more densely. They tended to group themselves more about the blood-vessels. Signet-ring cells were less common. The blood-vessels were still thin tubes of endothelium and white blood-cells were extravasated in the tumor stroma. The capsule was broad and intact everywhere.

There is much to suggest a classification of endothelioma for this tumor but its cells were of such bizarre type as to place it rather among the unclassified type.

A search of the hospital records at the M. G. H., up to Case numbered 270,000, revealed only two other cases of Angiosarcoma. Both were surgical cases, one in 1912, E. M., No. 282050, had a tender tumor of abdomen, which was found at operation to be a large globular mass in the surface of the liver. Biopsy showed small cells in solid masses arranged about vascular spaces for some of which they apparently formed the wall. The other in 1924, E. S., No. 262218, was found after laminectomy for a cord tumor, lying upon the dorsal surface of the cord between the cervical and 3d dorsal regions. Biopsy: "Angiosarcoma—clusters of small blood-vessels with thin walls, without surrounding cellular reaction."

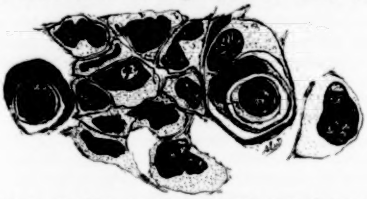


FIG. 5. Photostat of a photomicrograph using oil immersion lens. From the edge of a metastasis in the kidney; showing three cells on the right side and two cells on the left side, which illustrate the so-called signet-ring shape or nesting, like petrie dishes one within the other, which is described in the text.

In the necropsy files from 1899 to 1925, no cases, among 4500 necropsies, were found of hemangioma or angiosarcoma of the liver or elsewhere which did not have blood-vessel formation as the main feature of the tumor.

The following case was the only one showing globular masses similar to the one reported here:

1916. Necropsy No. 3615. A case, with clinical diagnosis of uremia and stricture of urethra, which had been operated upon three days previously, showed among other things, a hemangioma of liver, about 3 cm. in diameter, and multiple hemangiomata of jejunum. These were about ½ cm. in diameter and were attached to the peritoneum of the intestine by small pedicles. There were also several in the parenchyma of the lung. Microscopically the tumor consisted of "a sponge-work of blood-vessels devoid of smooth muscle and held together by a small amount of connective tissue." There was no nesting of cells in concentric rings.

DISCUSSION

A search of the available texts on pathology and a review of the literature did not disclose a tumor with similar metastases to the heart muscle or configuration of cell arrangements. It is probable that the tumor is related closely to either the endotheliomata or blood-vessel forming angiosarcomata, but the cells are so atypical as to defy definite classification. In the biopsy specimen removed four months before exitus, there was some differentiation and arrangement of the cells around spaces in a manner suggesting the formation of blood-spaces. In all of the other metastases, however, the tumors were soft masses of large, atypical, undifferentiated cells very loosely held together by a few thin connective tissue strands and the intracellular fibrils. These fibrils were evident at every acute angle of the cell periphery.

As the tumor probably originated in the liver and is definitely not a primary tumor of the liver tissue nor of connective tissue origin, it would seem logical that its source was blood-vessel endothelium. We can speculate that the tumor may have arisen from a hemangioma of the liver in which the cells lost their differentiation and metastasized first as a type of angiosarcoma with a few fairly slow-growing metastases (i. e. the biopsy specimen). Later the cells became more undifferentiated and metastasized more rapidly, and grew very rapidly.

This, of course, is only speculation. Neither Dr. J. H. Wright nor Dr. H. F. Hartwell, who both very kindly reviewed the sections of this case, would endeavor to classify the cell type, merely stating that it was an extremely undifferentiated cell type which defied definite classification at the present time.

SUMMARY

A patient with an atypical history and an unusual area of pain was almost classified among the psychoneuroses, when a biopsy of what was apparently a fibroma of the skin disclosed the presence of a malignant tumor. Necropsy four months later showed a soft, reddish-black cellular tumor of the liver with globular metastases to the heart, pleura, and the peritoneum along the mesenteric attachments of the intestines, kidney, pancreas, spleen, ribs, and several subcutaneous regions. Microscopically, the biopsy showed cells somewhat differentiated into blood-vessel formation, while the necropsy study shows almost a complete loss of cell differentiation with very little connective tissue stroma, and the formation of nested cells, resembling nested petrie dishes, one inside the other. It is not possible to classify the tumor at the present time into any one tumor type, although it probably fits best into the endotheliomata as a general class.

I wish to thank Dr. William H. Smith and Dr. J. H. Wright for permission to report this case and for their kindly advice and encouragement.

Since going to press a similar tumor with metastases to the heart has been reported by L. Smith, *Arch. Path.*, 1926, I, 365.

MEDICAL PROGRESS

THE PROGRESS OF NUTRITION

BY FRANCIS LOWELL BURNETT, M.D.

I. FOOD, ALIMENTARY CORRELATIONS, AND NUTRITION

ANIMALS in a natural environment undoubtedly have an instinct for the selection of food, which is a superlative expression of their demand for nourishment. By the exercise of this dominant natural faculty, the amount and kind of food are nicely regulated to develop and maintain their bodies in an almost perfect state of integrity. Domesticated animals lose this peculiar instinct and eat what is put before them. At one time primitive man may have had an instinct for the selection of food; but the man of today consumes food almost entirely by habit and custom; and its purpose and ultimate value are not given a great deal of consideration. Fortunately, by an understanding of the normal action of the colon, by which the intestinal contents are worked over and moulded, it now seems possible for all persons to regulate and control their habits and customs of eating according to the action of their own intestine in complete and proper nourishment.

In reflecting on the nature of digestion, absorption and assimilation in nutrition, there is one sequence of events by which food is changed to form and maintain the normal tissues. The factors that influence these events are numerous, but one quality of the ingested material that has been generally recognized is that it must be complete with the basic requirements of protein, fat, and carbohydrate, the accessory food factors, and the essential salts, or else some form of deficiency disorder is developed. Up to this time, investigators of nutrition have generally been content to study the ultimate effect of an incomplete food on the structure of the tissues, without comprehending that there was a primary disorder in digestion, absorption and assimilation. Indeed the tissue changes appear to be merely a metabolic disturbance, in which the intestinal functions are not normal. This point of view is important, because there are many factors in human diets, that produce a somewhat similar intestinal disturbance. Furthermore, studies of metabolism are largely concerned with an understanding of the catabolic processes or breaking down of the tissues; whereas if the anabolic or the building up of the body are given more consideration, the catabolic will take care of themselves; and a great deal more will be found out to restore and maintain health.

Some comprehension of the delicacy and complexity of the intestinal functions may be given in a consideration of some of the chemical correlations of the alimentary tract. Starling—(*Lancet* 2:423-501: August 12 and 19, 1905) The acid chyme entering the duodenum excites the formation of secretin in the mucous membrane, which in its turn causes a flow of alkaline pancreatic juice. The formation and absorption of secretin will proceed until the chyme is exactly neutralized by the alkaline juice. As soon as this neutralization occurs, the pyloric sphincter opens and allows the entry of a fresh portion of the acid gastric contents which will then call forth an exactly corresponding amount of pancreatic juice. The discovery of this simple chemical nexus between the alimentary canal and pancreas, suggests that other mechanisms of the same description take part in the complex chain of events involved in the digestion of food stuffs. Pancreatic juice, though it contains many ferments, is dependent for the full digestive activity on the co-operation of the bile and succus entericus. Two main factors are involved in the secretion of the succus entericus, the mechanical distension of the intestinal wall and the presence of pancreatic juice. It seems evident therefore, that in the alimentary canal the chemical mechanism seems sufficient to account for the secretion of all the digestive juices which are demanded of the food.

These automatic, sensitive, chemical and mechanical reflexes essential for normal digestion and absorption have not been given a great deal of attention in the restoration or control of health; and without doubt enormous variations occur in them without symptoms or recognized signs. This assertion is supported in a measure by the observation of Farmer (*Am. Journal Phys.* 75:45, Dec. 1, 1925) from a study of the decrease of digestive efficiency in polyneuritis. In this study extracts were made from the intestine of deficiently fed pigeons and mixed with different foods, but only 60% of the proteins, and no fat, or carbohydrate were digested; whereas with similar extracts from normal birds these foods were completely digested.

Further evidence that the delicate and complex correlations of the alimentary tract in complete and proper nourishment are not thoroughly understood is given by the statement of Eliot in the "Control of Rickets" (*J. A. M. A.* 85:656, Aug. 29, 1925). "The very intimate association of rickets with growth, its early appearance regardless of the season, and its universality, raise the question, which however I am not yet prepared to answer, whether a slight degree of rickets must not be considered normal." That a slight degree of rickets is common there is no question; but by those who appreciate the complexity of the nutritive processes, our ignorance concerning them and more particularly the ignorance of mothers about feeding their children, a slight degree of rickets can never be considered normal.

The relation of food to disorders of the body is receiving more and more attention. There are however, so many general observations on this subject, that many of them cannot be reviewed, and some should not, except to point out their unexact character. The "Abuse of Food" by Elliott (*New Orleans Med. & Surg. Journal* 78:59, Aug., 1925) refers to over eating in relation to sclerosis of the arteries, heart and kidneys. Formerly, high blood pressure was ascribed to alcohol and the strenuous life, but it seems now as if it develops in those that are sodden with food. A crusade against overeating should be started in the home by teaching mothers that few deaths occur from undernourishment; but when the head of a family dies at fifty from high blood pressure, the trouble goes back 20-30 years and is the inevitable result of the groaning tables and the second helping. Peterson (*Arch. Neur. & Psych.* 14:435, Oct., 1925) in an address on "Nutrition and Nerves," alludes to the effect of food on the nervous system. W. Mitchell's "Fat and Blood" is commented on as an advanced conception of the treatment of today. He gave his patients milk, butter and cod liver oil without realizing that these foods were rich in vitamins. Some of the fluid extract of malt also formed part of each meal. "Perhaps there is an essential beer soluble vitamin which may someday bring it back". Neurasthenia occupies a great deal of the neurologist's attention but it has not been thoroughly studied. It should be looked into from the standpoint of fatigue and nutrition. Changes taking place in the food of normal persons in institutions are observed by Fitz & Lautz (*Journal Am. Diet. Asso.* 1:9, June, 1925). They compared the diet of nurses at a hospital in 1914 and 1924. In the decade, 27 grms. less of protein, 11 grms. less of fat, and 82 grms. less of carbohydrate show a substantial reduction in the amount of food consumed; and an increase in the ingestion of vegetables and fruits. Such a change is thought to combat effectively two prevalent disorders of today—obesity and constipation. A general discourse on food is given by Van Nuys (BOSTON MED. & SURG. JOUR. 192: 1242, June 25, 1925). The vitamins are first taken up, then the amount and kind of proteins are discussed. In concluding, he says, practitioners are the workmen of the profession. New tools are given out by the laboratory workers to use skilfully. New discoveries in nutrition are, in a sense, a tool to be used to build up the health and strength of future generations.

Animals sometimes exhibit a peculiar selection of food that relates to some deficiency. If the common food is low or lacking in some essential they express a craving for peculiar foods. These facts have been described in an interesting paper by Green (*Pysiological Rev.* 5:336, July, 1925) in "Perverted Appetites." In this way sheep will eat wool, birds consume feathers, and fowls ingest eggs; and cattle will eat wood, stones and clothes in "licking disease". An alkali deficiency is probably the cause of these peculiarities. On the other hand, a disorder known as osteophagia, in which cattle eat bones is evidently due to a phosphorus deficiency as the addition of this substance to the food puts a stop to the perverted appetite, and improves the general condition of the animals.

The Practitioner for January 1925 is entirely devoted to articles in food, the vitamins and nutrition by eminent Englishmen. Some of the papers are: The Criteria of an Efficient Diet by Hopkins; Mineral Metabolism and Disease by Orr; Dietetics—General and Practical Consideration by Belprague; and Diet and the Indian Races by McCarrison. An outstanding work on the subject of Nutrition is a book by Jackson on Inanition and Malnutrition. (P. Blakiston & Co., Philadelphia, 1925.) Of the books published on nutrition, this one in point of comprehensive detail, accuracy, and references is the best. The author has not only collected most of the facts concerning the nourishment of animals and man, but has also written a few chapters on inanition and malnutrition in plants.

II. ANABOLIC PROCESSES AND THE CONTROL OF HEALTH

"Food is the Medicine of Health and Medicine is the Food of Sickness." Holmes (*Medical Essays*, Houghton & Mifflin, 1891, p. 275). A statement of this kind made by a noted physician and philosopher must have some significance. In the past medical investigators have given undivided attention to the study of disease; indeed the study has become so concentrated of late that intensive work has been done on special organs or tissues without realizing the correlated action of other parts of the body. This point has been commented on by Fishbein (*J. A. M. A.* 85:1030, Oct. 3, 1925). "The time has come to call a halt on geographic warfare within the body, and to look on it as a 'united states' that will be at least as firmly consolidated as the forty-eight individual constituents of our government."

An understanding of nutrition by which every organ, tissue and cell is for the most part developed and maintained, is to realize that the body is a unified whole. This aspect is still further broadened when the delicacy and complexity of the anabolic processes are considered. For not only are the mechanical functions of the intestine, the chemical action of the digestive fluids, and absorption nicely correlated; but these processes are evidently influenced in turn by the amount and composition of the alimentary mixture, and the demands of the body for activity and for rest. It is incomprehensible that the digested products absorbed from the aliment and assimilated by the tissues, will become known for sometime. The chemistry of the normal development and maintenance of the cells is much too complex. In several recorded observations it seems very probable that some of the tissues have shown a change or regeneration by an improvement in the anabolic processes. One of these has been described by Boyd & Robinson (*Am. Jour. Path.* 1:135, 1925). A child had severe diabetes, adhered strictly to a very reduced diet, but did not improve. With large doses of insulin the carbohydrate tolerance was increased and the blood sugar became normal. With the carbohydrate metabolism controlled and an adequate diet, there was a steady improvement in his general condition and also the pancreatic functions. Inside of a year he changed from a chronic invalid to a robust boy. At this time he was accidentally killed, a post mortem examination made immediately, and in sections of the pancreas active signs of regeneration were apparent in the acinar and islet cells.

In the present state of our knowledge of health and disease, we are apparently groping about in a sub-stratum of marked changes of bodily condition. At times incapacitating disease is experienced, sometimes ambulatory ill health, and rarely entire freedom from bodily disorders. On the other hand through the understanding and control of the factors that influence the anabolic processes, it seems quite possible that we may aspire to a state of health far superior to any at present known. But the change that takes place in passing from a state of improved well being to the sub-condition of vague ill health and disease is not attended by definite symptoms or well recognised signs of disorder; and contrariwise in relieving metabolic disorders, by adjustments in the diet and mode of living, there may be an improvement of the anabolic process, so that the tissues will get the normal substances from the food. When the diet has been adjusted to elicit the normal action of the colon in the treatment of some of the diseases of the skin, the lesions of eczema and psoriasis will gradually disappear. The results of this improved state of nutrition indicate that the anabolic processes become more nearly normal, and the cells of the skin apparently assimilate the substances from the food that are essential for keeping them healthy. The skin however, remains healthy only as long as it receives good nutrition. Accordingly, the only cure of disorders of the skin due entirely or in part to metabolic disturbances is the control of health. In observations on the control of health after eczema and psoriasis (to be published), many patients thought they were cured as soon as the lesions disappeared; but being human they soon afterward relaxed their efforts, went back to careless ways of eating and were soon surprised to notice new lesions of the skin. The same sequence of events is frequently reported of another metabolic disorder—diabetes mellitus. As long as the restricted diet is adhered to, the blood sugar may be kept normal.

In reducing the amount of food consumed at the first two meals and improving the alimentary mixture in other respects, it is possible to elicit the normal action of the colon. By this action the feces will become entirely formed of discrete masses, and the passage of a single meal through the bowel, or the intestinal rate, will be considerably lengthened. The equilibrium of the bowel in this condition however, is not only complex, but very delicate; and an exact method must be applied to bring about this action. For this purpose the patient must keep a record for a week of the food, time spent at meals, time and kind of dejection and an estimate of the intestinal rate. By this method it is possible to educate and adjust the alimentary mixture, and rectify or prevent the abnormal action of the colon; because when the feces are soft and formless they are an indication of intestinal indigestion and due to a faulty food factor. As the normal form of the feces is commonly dejected twice a day, all persons have an opportunity to observe and keep a check on their own nutrition in the control of health. An additional check should be made on the intestinal rate and recorded. If this is frequently abnormal, the amount of food, the way of eating, or the proportion of the food, etc., is at fault, and should be improved on. Then, as every adult person has a normal weight which is a sign of the best physical fitness, the body should be weighed every month and recorded and the normal weight maintained. If there is a change upward or downward, minor variations have occurred in the anabolic processes, and should be corrected. Finally, once each year every one should undergo a comprehensive and detailed examination. From this point of view the purpose of such an examination is not so much to discover disorders, but rather to ascertain superlative health.

III. DIGESTIVE EFFICIENCY AND ABSORPTION

The digestive system is a canal which traverses the body. If this canal is merely thought of as a tube through which the aliment passes regularly in the same way, it is impossible to understand the new and critical aspect of nutrition; on the other hand, when it is thought of as a highly perfected organ which was purposely designed to nourish the body, the automatic and sensitive nature of its action in complete and proper nourishment may be partly appreciated. Inferences on the peculiar action of the colon have been drawn by Lineback (*Am. Jour. Anat.* 36:357, Nov. 15, 1925) from a study of its musculature. The longitudinal fibres form the taeniae, where there is a close union with circular fibres; therefore, the taeniae appear to form fixed cables against which segments of the circular fibres pull to form the clefts and haustra. An atonic stomach according to Timbal (*Arch. de Mal. de L'appar Dig.* 15:229, March, 1925) discharges its contents more rapidly than normal, and an atonic colon apparently acts in a similar way. In a clinical study of colonic functions, Gardner (*Minnesota Medicine* 8:498, Aug., 1925) describes different forms of the feces and gives histories of patients that illustrate colonic dysfunction. The illustrations of the specimens do not appear very definite or significant; and the patients are generally typical of "dyspepsia". The treatment consists largely of educating them to eliminate cathartics and irritating foods, in order to bring about more natural dejections.

Interesting and valuable observations have been made by Silverman and Denis (*Arch. Int. Med.* 35:357, March, 1925) on the concentration of enzymes in the duodenum. Milk, cream, egg albumin and starch were ingested by a patient with a duodenal fistula and the enzymes tested at short intervals afterward. Eighty minutes after the ingestion of egg albumin, the amylose and protein almost doubled their strength, and the lipase increased considerably but the starch, although very appetizing, did not show any increase in the concentration of the amylose over the protrase. The cream brought about a protracted increase in the lipase concentration. In another study Silverman and Denis (*Am. Jour. Med. Sci.* 170:727, Nov., 1925) tested the effect of commercial pancreatic preparations on the enzyme concentration of the doudenum in vitro and in vivo. The preparations showed considerable digestive power outside of the body, but within, their potency was not so evident. Indeed the proteolytic activity may be ascribed to stimulation of the enzymes by the ingestion of protein.

The valuable observations of Carlson (*Phys. Reviews* 3:1, Jan., 1923) on the gastric juice in health and disease showed that there were all degrees of hypoacidity, but not hyperacidity. In considering the potency of the digestive fluids in the treatment of nutritional and metabolic disorders, it is necessary to realize that even with good absorption the digestive fluids may not be fully potent, and only a part of the aliment is reduced and utilized by the body. This fact is sometimes strikingly illustrated in the slow recovery of patients with extreme metabolic disorders. Combined with a failure of digestion if there is also a failure of absorption recovery is even more remote. Changes in the amount and kind of absorption have been shown by Burnett (*J. A. M. A.* 85:1777, Dec. 5, 1925). With seeds as a marker, an evening meal in a healthy person takes about 62 hours to pass through the bowel; and continues to be seen in one and two normal dejections for about 134 hours. There are many individuals however on account of some of the faulty food factors who habitually have a rapid intestinal rate, in which an evening meal appears in 10 hours and may be seen for 62 hours. The failure of absorption and assimulation may be the cause of various disorders.

An investigation on the absorption of nutritious substances from different parts of the intestine, has been made by Nakazawa (*Tohoku Jour. Ex. Med.* 6:130, June, 1925). The author tied off sections of the jejunum, colon, and rectum of anesthetised rabbits and cats, injected water, normal salt solution, glucose, glycocol, peptone and fatty acid, into the isolated loops, replaced the intestine for a specified time, and then observed the amounts of these substances absorbed. The rate of absorption of the colon is nearly half that of the jejunum. In the jejunum of rabbits there was an absorption of 60% glucose and glycocol, 43% fatty acids, and 30% peptone and sodium chloride; in the colon the percentages were sodium chloride 54, glucose and glycocol 30, and peptone and fatty acid 20. The rectal absorption was considerably less. In cats jejunum 100% glycocol, 82% peptone, 50% glucose and sodium chloride, and 35% of the fatty acid were absorbed; in the colon about half of these percentages—with the exception of glucose at only 17%—were absorbed. These results are interesting and may be valuable but refer only to the absorption of food from isolated loops of the intestine. They cannot be accepted as an indication of the absorption when the aliment passes through the bowel naturally and the normal intestinal functions are in action.

With increasing evidence that the normal stool is well formed and is associated with a slow intestinal rate, constipation and the abuse of cathartics and laxatives are becoming more and more denounced. Dewis (BOSTON MED. & SURG. JOUR. 193:152, July 23, 1925) concludes his observations in this subject with this advice. "It is dangerous to prescribe cathartics in acute or painful conditions of the abdomen; it is wrong to administer them before abdominal operations; it is injurious to give them habitually in constipation; and bad practice to order puragatives without knowledge of their various physiological effects, or recommend them to patients when not sure of the ailment."

IV. LACTATION AND THE NOURISHMENT OF CHILDREN

"A substantial pair of mammary glands have the advantage over a pair of hemispheres of the most learned professor's brain in the art of compounding a nutritious fluid for infants." Holmes (*Medical Essays,* Houghton, Mifflin & Co., Boston, 1891, p. 276). There appear to be conditions, however, which influence the lactating breast, so that all of these glands are not substantial. From a study by Adair (*Am. Journal Obs. & Gyn.* 9:1, Jan., 1925) of the influence of diet on lactation, food factors have to be taken into account in the production of milk. He divided the mothers into groups of a hundred, and observed the effect of a high protein diet of 2,400 calories, a high carbohydrate of about 3,200 calories, a high fat of 3,900 calories. An excess of food in the high fat and carbohydrate diets did not show a corresponding increase in the amount of milk produced. The milk ingestion and weight increase of the infants in the neonatal period would seem to indicate that the milk secretion increases more steadily on rations that contain a liberal amount of protein. Indeed the hospital, high protein, and balanced diets seemed to meet the needs of the mothers and infants better than either the high fat or high carbohydrate diets. In a study of the food intake of rats during pregnancy and lactation Wang (*Am. Jour. Phys.* 71:736, Feb., 1925) found that there is no increase during gestation, but somewhat more is consumed after parturition; and at this time too, there is a marked decrease in the activity.

Variations in the constituents of human milk have been carefully worked out by Gardner and Fox (*Practitioner* 114:153, Feb., 1925). Samples of milk were taken between 9 and 10 A. M.; and before and after nursing in five periods up to nine months. Although minor variations were found in the protein, fat, and carbohydrates from day to day, the variations during the periods were marked. For instance, the fat was 75% during the first week, 86% in the second; on the other hand the protein showed a gradual decrease; and the carbohydrate showed marked variations. Then the quantity of milk and the composition did not show any relation.

A marked change in the proportion of milk supplied nursing infants sometimes has a beneficial effect. Langer and Schmal (*Zeitschr. f. Kinderheilk* 39:80, 1925) found the milk of wet nurses, sometimes very low in protein, and while infants were getting 150-200 calories per kilo of body weight they failed to gain, but by the addition of 10 grms. of plasmon to the milk there was a substantial and regular gain.

Meyer and Nassau (*Klin. Wockenschr.,* Berlin, 3:2132, November 18, 1924) tried the effect of human milk on young guinea pigs, and although they did not develop scurvy many of them died. The cause of death was evidently due to insufficient protein, as guinea pig milk contains three times as much protein as human. Similar incompatibilities of milk ingestion have been found by Daniels and Stearns (*Am. J. Dis. Child.* 30:359, Sept., 1925). They estimated the nitrogen, calcium and phosphorus balances from feeding infants on cow's and goat's milk. The utilization of the phosphorus was higher but the protein lower in the latter; otherwise the mineral metabolism was the same with both foods. Daniels and Hutton (*J. Biol. Chem.* 63:143, Feb., 1925) also tried the effect of feeding rats entirely on cow's milk; but the animals could not reproduce and lived only a short time. The deficiency was evidently due to mineral salts, as the addition of manganese, flourin, sodium salicylate, and albumin to the diet brought about normal fertility.

Malnutrition in children is becoming a matter of ignorance or carelessness on the part of parents according to McDougall (*Public Health Jour.* 16:25, Jan., 1925). He examined 370 children and found the cause of malnutrition to be mismanagement, physical defects, faulty food habits, over fatigue, and faulty health habits. He recommends that parents be required to have their children normal in weight before they are admitted to school. "The Flabby Child" is discussed by Paterson (*Brit. Med. Jour.* 1:301, Feb. 14, 1925) as a phase of depressed metabolism and malnutrition. The factors that bring about flabbiness are over-feeding, especially with an excess of starchy food, too little exercise, fresh air, and sunshine, and over clothing. An account of deficiency diseases in children is given by Tisdall (*Canada, Med. Asso. Jour.* 15:904, Sept., 1925). He alludes specifically to the development and treatment of rickets, tetany, and scurvy in children. The malformation of the bones in rickets is the most pronounced feature, but other tissues and fluids of the body are likewise affected. Anemia is a common associated condition; and a general lack of vital resistance makes otitis media, bronchitis, and pneumonia serious complications. Codliver oil and exposure to the ultra violet rays will prevent and cure rickets and tetany; orange juice is a specific for scurvy. In view of the ease with which these deficient diseases can be prevented, their development must be regarded as a very serious reflection on our professional ability.

In 1888 Samuel Gee (*St. Barth. Hosp. Rep.* 24:17) described chronic intestinal indigestion (celiac disease) in children as follows. Signs of the disease are yielded by the feces, which are soft, pale, bulky, frothy, and appear like oatmeal gruel. Furthermore, the regulation of the food which he advocated is generally followed today; for as he remarks "if the patient can be cured at all, it must be by the diet". Sauer (*Am. Jour. Dis. Child.* 29:155, Feb., 1925) gives an interesting and valuable account of the disease. He recommends three stages in the dietary treatment. (1) Protein milk exclusively; (2) protein milk with additional protein foods; (3) protein foods with additional green and starchy vegetables, and sugars. Brown et al (*Am. Jour. Dis. Child.* 30:675, Nov., 1925) made a chemical and bacteriological study of chronic intestinal indigestion in children, in order to explain the value of the high protein diet. They consistently found predominantly gram positive aciduric intestinal flora of the B. bifidus group and an abnormally high ammonia content of the feces. The inoculation of milk with the highly proteolytic spore bearing bacillus brought about extreme metabolic changes; and young rats given this milk did not gain in weight. The streptococcus lacticus used in the preparation of the protein milk establishes itself in the intestine in the beginning of treatment, but takes a long time to replace the offending flora. Hammond and Hsia (*Am. Jour. Dis. Child.* 29:729, June, 1925) report observations on the diet and development of Chinese children. These children eat about half the food of Americans, and it is without milk, eggs, butter and only a little fruit. The protein is about 12%, fat 14% and carbohydrate 74%. On this limited diet the children do a lot of work and are unusually healthy.

V. THE VITAMINS

A report on nutrition without some account of the vitamins is incomplete, and yet the nature of these vague and elusive compounds are becoming more and more difficult to understand and describe. This is in part because they do not always appear specific in their action, in part because one of them has become fractioned, and finally because a few new ones have been jammed into the literature on nutrition and are not generally accepted. Some of the most recent information about the vitamins is given by McCollum and Evans (*Lectures on Nutrition*, W. B. Saunders & Co., Philadelphia and London, 1925) two of the authors of this book.

Originally fat soluble A was known as the anti-rachitic vitamin and to many this terminology still applies; but today some writers describe vitamin D as the anti-rachitic, and vitamin A as the anti-opthalmic. The experimental evidence for such a cleavage is not perfectly clear; and furthermore adds confusion to an issue which at best appears pseudo-scientific. In order to determine the presence of vitamin D, rats are put on a diet of maize, wheat, gelatin, wheat gluten, sodium chloride, and calcium carbonate. After 40 days on this diet, the animals will develop marked rickets, without calcification of the cartilage. In this condition they are allowed to starve for several days, and if the diet has been without vitamin D it will produce a positive "line test." Under these circumstances the phosphorus of the blood is trebled, the normal calcium-phosphorus balance restored, and calcification or healing takes place in the bones.

The prevailing opinion of American and English investigators is that beri-beri is a disease due to a lack of vitamin B in the diet; and thus continues to be generally known as the antineuritic food factor. Some of the Japanese, however, will not admit that this is the only cause of the disease. Yeast continues to be the commonest and most potent source of vitamin B. For the growth of yeast cells a nutrient principle called "bios" may be necessary; and the substances that are richest in vitamin B have this stimulating effect on yeast.

Vitamin C remains as always, the anti-scorbutic factor. It is commonly found in fresh fruits and vegetables, but is easily destroyed by oxidation. If, however, the fresh fruits and vegetables are treated so that the oxygen is used up before applying the heat essential for canning, some of the vitamin content is preserved.

Vitamin E has been added to the others as a fat soluble food factor which is essential for reproduction. When rats are reared on a diet of protein, fat and carbohydrate, with vitamins A and B, and a complete salt mixture, they grow well and have every appearance of health. But as they mature they develop complete sterility. At this time if vitamin E is added to the diet, they become fertile. It is to be found in a great variety of animal tissues, fat muscle and some of the glandular organs. Milk, however, is low in this essential food factor. Codliver oil is entirely without it. In seeds and green leaves vitamin E is concentrated. Relatively small amounts of dessicated lettuce leaves are especially potent; and wheat germ is the most abundant source of this anti-sterility vitamin.

Goldberger and Tanner (*U. S. Public Health Reports* 40:54, Jan. 9, 1925) have described the vitamin P.P. as one preventing and curing pellagra and is described under that heading.

VI. RICKETS, TETANY, CALCIUM AND PHOSPHORUS METABOLISM

The unexplored zone between health and the pronounced signs of rickets is becoming more clearly defined. This is shown by Eliot (*J. A. M. A.* 85:656, Aug. 29, 1925) in an interesting study on the control of rickets. In this work most of the babies in a certain district of a large northern city were weighed, measured, generally examined, and roentgenograms made of both wrists. The mother was given instructions about feeding, the value of sun baths, and the use of cod liver oil. After that further examinations were made once a month for a year. The 216 babies generally given anti-rachitic treatment throughout the period were compared to a group of 127 babies, whose mothers had not been instructed. In the treated group about 90% showed evidence of rickets, whereas in the control group 96% presented evidence of the disease. In commenting on these observations the investigator remarks that the chronicity of rickets is striking. Premature and obese babies who grow very rapidly uniformly show signs of rickets in the first four months. By this accurate method of examination rickets is found to be almost universal.

The value of diet or light in the treatment of rickets was considered by Reyher and Schmaucks (*Arch. f. Kinderheil.* 75:161, Feb. 10, 1925) in 35 patients. Diet was found to be the most efficacious, sunlight was only a subordinate factor and explains the seasonal improvement. The same point of view is taken by Variot and Nazarie (*Bul. de la Soc. Med. dis. Hosp.* 49:1433, Nov. 13, 1925) for they found that faulty feeding rather than the absence of sunlight was responsible for the abnormal growth of the bones. Of a group of 233 children with rickets they found only 36% undersized; but most of them walked and had their teeth erupt at the usual time. A very detailed consideration of the treatment of rickets has been made by Jundel (*Acta Pedeat.* 4:204, April 15, 1925). Light treatment should be given only to patients if reducing the diet has an injurious effect or the disease is complicated with another disturbance—especially tuberculosis.

Experimental evidence from studies on animals also shows that diet is the most important factor in the prevention and cure of rickets, according to the work of Webster and Hill (*Brit. Med. Jour.* 1:956, May 23, 1925). They found that exercise and open air without sunlight did not influence the disease, but exposure to sunlight or ultra violet rays for two hours a week will protect animals; and animals subjected to high temperatures if fed a normal diet do not show abnormal bone formation. Cod liver oil and light facilitate the absorption of calcium and phosphorus from the intestine. Further evidence of the effect of light on rickets is shown by Marfan (*Presse Med.* 33:97, Jan. 24, 1925). He raised some rats in the dark, gave them a complete diet, and found they did not develop rickets. He believes that light acts through an improvement in nutrition and does not act directly on the formation of the bones. Up to this time rats have been commonly used for the study of rickets, and dogs and pigs have been used sometimes; but Goldblatt and Moritz (*Jour. Ex. Med.* 42:499, Oct., 1925) found when roughage in the form of devitamized alfalfa hay was added to a synthetic diet that a severe and fatal diarrhea was prevented in young rabbits, and the lesions of rickets could be produced. With this diet the inorganic phosphorus of the blood was very much reduced, while the calcium remained about normal. McCollum et al (*Jour. Biol. Chem.* 65:97, Aug., 1925) have made up a diet in which soft wheat is used instead of hard wheat in order to reduce the amount of phosphorus and make the diet invariably produce rickets.

In constitutional disorders, pronounced lesions are generally produced in one tissue by which the disease is recognized, but there are also minor changes in many of the tissues which are not frequently observed. In rickets, the pronounced disturbance is in the bones, but other tissues are likewise affected. Manville (*Arch. Int. Med.* 35:549, May, 1925) observed that the pathological conditions arising from a diet deficient in vitamin A is first a general disease in the glandular activity that results in xerosis of the eye, mouth, larynx and skin, and in malnutrition and sterility; and second the changes that occur as the result of bacterial inversion. Wolbach and Howe (*Jour. Ex. Med.* 42:753, Dec., 1925) have made a very careful and exact study of the effect of a vitamin A deficiency in rats. They note that specific changes occur in the epithelial tissues. This effect produces stratified keratinizing epithelium in various parts of the respiratory, alimentary, genitourinary tracts, the eyes and parocular glands. In this distrophic growth the mitochrondrial apparatus is not primarily affected; for the first morphologic evidence of a change is in the nucleii. An increase in chromatin and in the size of the nucleoli appear to be early manifestations of the deficiency. In a few of the animals the number of mitotic figures and the response of the connective tissue and blood vessels suggest neoplastic properties.

The pathogenesis of tetany has been described by Critchley (*Arch. Int. Med.* 35:100, Jan., 1925). According to this investigator, it is due to a metabolic disorder, and leads to toxic nitrogenous by-products in the blood which are excreted as urea and creatinin. The acid base and calcium may be secondarily affected. From a study of calcium metabolism in premature infants, Muhl (*Acta. Pediat.* 5:188, Oct., 1925) notes that up to a weight of 2000 grms. fat absorption is low. Overfeeding often causes an intestinal disturbance in which there is a failure of calcium absorption. The addition of calcium chloride sometimes improves the metabolism. Zotterman (*Acta. Pediatrica* 5:180, Oct., 1925) has studied calcium dialysis of cow's and human milk. Hydrochloric acid was added to the two milks to a pH of 4.6, but if the acidity is increased beyond this point the dialysible calcium is decreased. Cow's milk has a higher phosphorus content and requires four times as much acid to reach a pH of 4.6. This has to be considered in infant feeding because the stomach has to secrete so much more hydrochloric acid.

Our knowledge of disease has been greatly augmented by the valuable and comprehensive work of Maxwell and Miles (*Jour. Obs. and Gyn., British Empire* 32:433, 1925) on osteomalacia. This curious disorder is especially prevalent in northern China and its principal characteristic is softening of the bones. The authors give a historical account, the general symptomatology, observations on the foetus, etiology, sequelae, and the treatment of the disease. They state unquestionably that it is due to a deficient diet in which the mineral content and the activator for calcium metabolism are insufficient. By improving the diet and the administration of cod liver oil the disease may be prevented and cured. Miles and Feng (*Jour. Ex. Med.* 41:137, Jan., 1925) have also made a special study of the calcium and phosphorus metabolism in osteomalacia. The amount of these elements in the blood varied somewhat according to the duration and severity of the disease, but in general were half the normal amount. The result of this work bears out the assumption that osteomalacia is similar in many respects to rickets, on account of the disturbed calcium and phosphorus balance, the occurrence of tetany and hyperexitability of the muscles and reflexes, and the response to treatment by improved diet and cod liver oil. The similarity of the two disorders is corroborated in a paper by Stapleton (*Lancet,* 1:1119, May 30, 1925) from a consideration of 73 patients in India. According to this author no sharp dividing line can be drawn clinically between late rickets and osteomalacia, and moderately severe cases have characteristics of both diseases. The purdah mode of living with lack of sunlight and little exercise is thought to be the cause.

VII. BERI-BERI AND SCURVY

In the history of nutrition beri-beri will hold an important position, because the original observations of Eijkman on this disease directed the attention of investigators to the study of deficiency diseases. Animals without the water soluble factor lose their appetites and ingest very little food. Observations on the relation between vitamin B and appetite have been made by Cowgill et al (*Am. Jour. Phys.* 73:106, June, 1925). Yeast and a wheat embryo preparation were given to dogs suffering from a deficiency of vitamin B and the appetite was restored. Under these circumstances the restoration of the appetite was not accompanied by an increased flow of gastric juice. Commercial beef extract brings about an increased flow of this digestive fluid, but the desire to eat is not restored. Hofmann (*China Med. Jour.* 38:987, Jan., 1925) studied the effect of pregnancy on beri-beri, and finds that it is not a predisposing cause, but does make the disease more severe. A very comprehensive examination of a single patient with beri-beri is given by Kepler (*J. A. M. A.* 85:409, Aug. 8, 1925). The patient gave a history of a prolonged and unvaried high carbohydrate diet of raw starch. Besides the polyneuritis, nephritis and myocardical failure were observed. Marked improvement followed the administration of antolysed yeast and the ingestion of a well proportioned food.

A critical examination of 92 patients with scurvy has been made by Comby (*Arch. d. Med. d'enfant* 23:1, January, 1925). A pseudo paralysis was found in 90%, bleeding gums in 80%, but hemorrhages into the skin or kidneys in only 10% in children under 18 months. In all of the patients refined foods were found to be the cause, and their replacement by fresh milk, fruit juices, and vegetables rich in vitamin C, readily relieved the condition. Frank (*Klin. Wochenschr* 4:1204, June 18, 1925) fed guinea pigs on human and cow's milk but found that scurvy could not be prevented. The effect of cow's milk in this respect was a little better than human.

VIII. PELLAGRA

Although pellagra is generally thought of as a deficiency disease and due to insufficient protein in the food, further investigations of the lesions produced make its origin more conclusive. The careful work of Denton (*Am. Jour. Trop. Med.* 5:173, March, 1925) on the pathology of pellagra contributes a great deal of information about this peculiar disorder. He was able to make thorough post mortem examinations of twelve patients dying of pellagra. All of them had typical lesions of the skin, ulcerations of the mouth, signs and symptoms of digestive disorders—of which severe and persistent diarrhea was the most pronounced—stupor, and a few had delusions. Areas of roughness and atrophy of the skin corresponded to the vascularity and fibrosis. Lesions of the mouth, tongue and oesophagus are peculiarly characteristic. The lesions of the colon are almost specific. Here there are numerous minute necroses covered with fibrin. Some of the glands form cysts, others are rudimentary, many have disappeared. Lymphocytes, plasma cells, endothelial leucocytes and eosinophiles surround the small vessels. The surface epithelial cells vary a great deal in size, shape and appearance. Degenerative changes were found in some of the cells of the central nervous system. While the skin lesions appear like an X-ray dermatitis, and might be photo-dynamic, the lesions of the alimentary canal are so similar that they preclude this possibility. An infection seems very improbable.

Evidence that pellagra is a nutritional disorder is still further borne out by the report of Bender (*J. A. M. A.* 84:1250, Apr. 25, 1925) in which patients with ulcer or cancer of the stomach failed to absorb nouishment, lost 16-30 kgs. of weight, and developed typical lesions of pellagra. Nuzum (*J. A. M. A.* 85:1861, Dec. 12, 1925) adds observations on two more patients, who on account of malnutrition from cancer of the ileum had characteristic cutaneous and alimentary lesions of pellagra. Mook and Weiss (*Arch. Derm. and Syph.* 12:649, Nov., 1925) report on the treatment of two patients with pellagra. In one the disease was self induced by unintelligent dieting; and not only was a liberal protein diet required, but also fat and the vitamins before recovery was complete. The other patient got well by the addition of protein to the diet.

Ardor for establishing new vitamins continues. Goldberger and Tanner (*U. S. Public Health Reports* 40:54, Jan. 9, 1925) in a study of the pellagra-preventive action of dried beans, casein, dried milk, and brewers yeast, announce the pellagra-preventative factor P.P. The soybean and the black eye pea in substantial amounts did not influence the course of pellagra; but with a good quantity of casein the general nutrition of the patients was improved, though some had recurrences. Dried milk also has a pellagra-preventative action. Brewers yeast, one gram to one kilogram of body weight, was found to be exceptionally potent as a therapeutic agent in this disease. It is largely on this account that the investigators are attempting to establish the vitamin P.P.

IX. FOOD, RENAL INJURIES AND HYPERTENSION

The renal injuries produced by high protein diets in some animals have been well established. Newburg and Marsh formerly fed rabbits on protein diets and produced nephritis, but recently as the normal food requirements of the rabbit are not known, they have continued their work on white rats. With a complete diet dried beef was added in varying percentages from 8-39% with protein up to 16% casts were not apparent in the urine, but with 18% for four months, 6% of the animals showed evidence of nephritis; and from then on there was a gradual increase, so that all of the kidneys of the rats with 39% protein were affected in 10 months. With a high protein diet however, there is an increase in the excretion of the amino-acids. Working on the assumption that these acids were responsible for the lesions in the kidneys these investigators (*Arch. Int. Med.* 36:682, Nov., 1925) gave rabbits and dogs a complete diet, kept them in good condition, and then injected most of the amino-acids into the veins. The injection of alanin, leucin, glycin, phenylalanin and glutamic acid, did not have an injurious effect on the kidney. Arginin and aspartic acid have a mild effect, while lysin, histidin, tyrosin, treptophan and cystin, produce severe kidney lesion. Jackson (*Proc. Soc. Ex. Bio. and Med.* 22:410, 1925) reports the occurrence of a spontaneous nephritis in albino rats on a diet deficient in vitaman A. The diet was one commonly used; and contained oats, corn meal, white wheat flour, flax-seed, bone meal, dried milk powder, raw liver, and fresh cabbage. The immediate cause of the nephritis was evidently due to an infection from lowered vital resistance. In the treatment of nephritis Koehne (*J. A. M. A.* 84:1103, April 11, 1925) recommends a diet of 1200-2000 calories in which there is only 25-50 grams of protein. The diet should also contain the accessory food factors, and take into account the acid-base balance.

In a study of nutrition and nephritis Reader and Drummond (*Jour. Phys.* 59:472, Mar., 1925) fed rats on a diet containing from 45-90% protein; and while the animals failed to grow they appeared to be in good health and hypertrophy of the kidneys was found as frequently in control animals on a well balanced ration as those on a high protein diet.

An interesting study of the causes of high blood pressure was made by Faber (*Acta. Med. Scand.* 61:53, 1924). He examined 1,000 young soldiers and found by the Riva-Rocci method the pressure was 119 mm. of mercury. The pressure, however, of 300 persons who were not ill, but had gone to a health resort to get thinner was different. In the men there was a slow rise up to 45, but in women little if any rise up to 35 years. From then on in both sexes there is a rise of about 10 mm. for every decade. A loss of 3-5 kilos, in weight brought about a decrease of 15-30 mm. in the blood pressure. Experimental hypertension has been produced in rabbits by diets containing an excess of protein from liver, soy beans, or oats, by Nuzum et al (*Arch. Int. Med.* 35:492, April, 1925). Readings of the pressure were made by cutting off a small piece of skin over the anterior tibial artery and watching the pulse. After six months on these diets the highest pressure ranged from 13-18 mm. of mercury above the controls. With the elevation of pressure there was also a marked increase in the non-protein and urea nitrogen. Normal rabbits have about 36 mgs. of NPN to 100 cc., but animals on the soy-bean diet had an increase of 72 mgs., the grain to 50 mgs., and the liver to 48 mgs.

X. EXERCISE, FOOD AND IRON IN BLOOD REGENERATION

The blood like other tissues is constantly changing. Corpuscles break down and new cells are added to replace those lost. As the normal equilibrium of this tissue is one of the most delicate and at the same time important in the body, factors that influence the regeneration of corpuscles continues to be carefully studied. One of the regenerative factors is undoubtedly muscular exercise. Schneider and Havens (*Am. Jour. Phys.* 36:241, Feb., 1915) sometime ago, studied the effect of muscular activity on the blood. The immediate effect of strenuous exercise in an athletic contest is to increase the corpuscles, but this is due largely to a concentration of the blood from a loss of fluid. But a more important result is the increase of the haemoglobin and number of corpuscles after a period of training. Under these circumstances, when the blood volume is the same, there may be an increase of 3% in the haemoglobin.

Although the anemia accompanying disease and that of haemmorhage may not be influenced by the same factors, any clue leading to the regeneration of the corpuscles should be valuable. Several years ago Whipple et al (*Am. Jour. Phys.* 53:167, 1920) publish the results of a very comprehensive study of the influence of different foods on the regeneration of corpuscles in dogs with acute haemorrhagic anemia. They have extended these studies and now publish (*Am. Jour. Phys.* 72:395, May, 1925) observations on the influence of different foods on the regeneration of corpuscles in dogs with severe anemia, which was kept constant by numerous bleedings. The animals were given one kind of food for a week or two and then the increase in the haemoglobin was estimated. The food consisted of bread, beef, liver, brains, salmon, cod fish, kidneys, tripe, etc. Of these foods, bread showed the poorest haemoglobin production, whereas liver was the best. The increase with this food may be as much as 90-100 grams of haemoglobin above the maintenance factor. In the same publication the investigators studied the effect of iron, arsenic, and geranium dioxide. Although Blaud's pills do not have an effect on an acute anemia, there appears to be an iron depletion in a severe anemia on which they have a favorable reaction. Geranium dioxide and arsenic are almost inert. Green vegetables, especially spinach and beet greens have only a slight influence on the production of haemoglobin. In conclusion the authors state that "food factors deserve serious study under controlled conditions by physicians who would understand the complex anemias associated with human disease."

A few more observations on the relation between anemia and nutrition have been made by Williamson and Ets (*Arch. Int. Med.* 36:333, Sept. 15, 1925). They also bled animals and observed the regeneration of the corpuscles with food and with iron. They find food valuable, but iron was found to be absorbed in the liver and spleen and was not coverted into haemoglobin. Hart et al (*Jour. Bio. Chem.* 65:67, Aug., 1925) fed rabbits on cow's milk and sodium citrate and produced an anemia. Inorganic iron added to the diet did not improve the anemia; but with cabbage or yellow corn meal the anemia may be prevented or cured. Chlorophyll with iron will also correct such an anemia.

XI. NUTRITION AND TUBERCULOSIS

Some evidence has already been found to show that the development of connective tissue to wall off an area infected with tubercle bacilli may be less in a deficiency fed animal compared with one on a normal diet. Observations on the effect of tuberculosis on experimentally fed animals have not been very satisfactory; because the guinea pig is too susceptible and the rat too resistant. Smith (*Trans. Am. Tub. Asso.* May, 1924) made a preliminary observation on the effect of the inoculation of B. Tuberculosis into rats on food without vitamin A or vitaminB. Infected animals with the mineral requirements of vitamin A failed to grow; but when five times the mineral requirement is added growth proceeds normally. This leads to the supposition that tubercular rats have an increased demand for the fat soluble factor, in order to keep in a good state of nutrition. Infected animals without vitamin B do not show any change in growth. Lange (*Am. Rev. Rub.* 11:241, May, 1925) tried the effect of various diets on rats inoculated with bovine tubercle bacilli. One diet was without vitamin A, another without B, a third high in fat, low in protein, and without A, and a fourth high in fat, low in protein and complete with the accessory food factors. Control animals were given an adequate and complete food. The results obtained were not at all striking. The course of the infection was essentially the same in all of the animals, with the exception of the one high in fat, low in protein and without the vitamins. On this alimentary mixture the animals showed an earlier complete elimination of the tubercle bacilli.

XII. DIET AND TUMOR FORMATION

From the rapid and abnormal growth of epithelial cells in animals on incomplete food, a suggestion has been made (Editorial, *J. A. M. A.* 85:2035, Dec. 26, 1925) that tumor formation may be the result of disordered nutrition. "Cancer and Diet" is the title of a study by Hindhede (*Acta. Med. Scandinav.* 62:379, Oct. 24, 1925), which was made on account of the recent alarming increase of cancer in Denmark. Charts are shown of the cancer statistics in that country; and then a comparison is made with the English figures. After that the death rates from cirrhosis of the liver, diseases of the digestive system and Bright's disease are compared with cancer; and in Copenhagen in 1911, the proportion was 105:133. On the basis of all facts, the author concludes that the main causes of cancer are: irritation of the digestive tube from too much condiment; alcoholic drinks and tobacco; overnourishment from food that is too varied and rich; and from badly proportioned food in which there is too much protein.

The effects of tumor formation and the nourishment of animals were observed by Sugiura and Benedict (*Jour. Cancer Research* 9:204, June, 1925). They found that rats and mice on a high protein diet were not abnormally susceptible to the Flexner-Jobling or the Bashford-

Trent tumors; but the susceptibility of these animals on a protein free diet was diminished. About the same results were found by Passey and Woodhouse (*Jour. Path. and Bact.* 28:133, April, 1925). Mice without fat soluble A were not markedly affected by soot cancer. Jorstad (*Jour. Exper. Med.* 42:221, Aug., 1925) studied the relation of vitamins to tissue reaction and injury. By the introduction of coal tar subcutaneously inflammatory cells and fibroblasts attempt to isolate the foreign substance, but with large amounts of tar the cells degenerate, the animal becomes cachetic and dies. If the cells are able to grow they divide, multiply, and form a tumor mass. In animals fed a large amount of vitamin A degenerative changes are prevented, and there is a stimulative of the secondary growth; but with an excess of vitamin B, the protection is not so complete and the action is limited in time and extent.

XIII. THE STATURE AND WEIGHT OF THE BODY

The development and stature of some of the semi-civilized people are very similar and are probably due to a limited food supply and much the same mode of living. Among civilized people, however, the conditions vary to such an extent that men are of many moulds. The clothiers recognize these variations in adult stature, and make suits to fit Big Bill, fat Tom, long John, well developed George, short and fat Freddy, and little Louis. In "Heredity and Culture as Factors in Body Build," Davenport and Nelson (*U. S. Public Health Reports* 40:48, Nov. 27, 1925) have attempted to determine the factors that influence development. They maintain that obesity may not be entirely due to the mode of living, but may in part be an inherited characteristic. The same may be true also of the long and lean and other types of body structure.

Among the environmental factors which influence the structures and functions of the living organism, nutrition is of primary importance. Jackson (*Science* 57:537, May 11, 1923) considers "Dystrophic Morphology and Its Significance" in a review of the cellular changes that take place in plants and animals as a result of inanition; and in conclusion states "the form and structures of all living organisms are clearly dependent in a large measure upon the quantity and quality of their nutrient. A knowledge of these effects gives a deeper insight into the process of morphogenesis and a means whereby it may be experimentally controlled to a degree hitherto generally unrecognized. Furthermore, not only the somatoplasm, but under certain circumstances even the germ plasm, may perhaps be likewise modified by nutritional conditions; a possibility of fundamental significance for heredity and evolution."

Every one has a normal weight and this may be taken as an index of the best physical fitness. At present the normal weight may show variations from standards of height and weight. But no two human beings are alike. The question, however, is not so much a matter of attaining physical perfection in accordance with the standards, but rather one of maintaining the normal weight with only slight variations. DuBray (*Am. Jour. Med. Sci.* 170:564, Oct., 1925) makes a few interesting comments on the relation of body weight to health and disease. The body weight is a simple measurement of extreme importance in clinical medicine. A marked variation requires an explanation. The tendency to accumulate fat is best controlled in the beginning, and in a majority of adults obesity can be controlled by restrictions in diet and hygienic measures. Marked overweight should be guarded against on account of a predisposition to diabetes, arthritis, and cardiovascular diseases. Surgical operations on the obese are facilitated and the mortality reduced if dietary supervision and treatment are carried on in the pre-operative and post-operative management of these patients. Loss of weight and malnutrition also have many important aspects. Impairment of mental and physical vigor, depression of the internal secretions, lowering of the metabolic rate, and increased susceptibilty to infection are among the significant results of undernutrition. But those who weigh not more or less than 10% above or below the standards live the longest.

XIV. HEALTH EXAMINATION

The mode of living of civilized man is not generally conducive to a healthy and long life in comparison to the existence of some of the more primitive people. If our ways of living have an influence on physical condition, it is evident that the body generally has an inherent capacity to maintain its integrity; and many of our diseases are generally the result of ignorance or carelessness in eating, exercising, resting and an appreciation of fresh air and sunshine.

The examination of the apparently healthy is becoming more and more essential, and the determination of incipient and vague disorders are being more clearly defined. While these results are very valuable, a knowledge of the measures by which many of these vague and incipient disorders can be cured is even more essential. Investigations of many of the terminal diseases have been carried on, and various theories elaborated about their determination and cause. In this way, valuable information has sometimes been obtained; but when all is said and done very little has been contributed to the cure and prevention of disease. At present, however, relatively little is known about health, and it is evidently through a knowledge of this superior state of health, and the measure by which it is brought about that some of the mentally inferior races enjoy comparative freedom from minor ills and their sequelae in some of the pronounced signs and symptoms of recognised disease.

Some of the factors that influence health have already received a little recognition. In an experimental study by Spaeth (*Am. Jour. Hyg.* 5:839, Nov., 1925) the relation between good physical condition and natural resistance to infection was made. In this work the investigator contradicts a previous opinion in which white rats became exhausted by forced exercise and showed an increased resistance to infection. But rats in good condition from voluntary exercise showed a lowered resistance. Similarly young starved or exhausted guinea pigs have the most resistance. These facts suggest that natural resistance is a function of the anabolic rate. In man such a relationship is recognized in the treatment of tuberculosis; and in diabetics in whom the anabolic rate is reduced to a minimum—susceptibility to infection is marked.

Numerous forms of health examinations have already been published by the medical associations; some of them are good, but not very detailed. A very practical and comprehensive hand book for health examinations has been compiled by Garland for the Massachusetts Medical Society (BOSTON MED. & SURG. JOUR. 193:947, Nov. 19, 1925). In this book the changing aspect of health and disease is discussed, and preventive medicine accentuated. Interrogations into the history of the patient, by which the family, previous and occupational influences are ascertained, and also inquiries into the habits of the person give important information. Under diet the author says, "little in the whole examination will give him (the physician) an opportunity for more constructive advice than in the matter of diet, and the manner of eating it." Further information is obtained by questioning the person about symptoms from the various systems. The examination of all parts of the body is discussed in detail, with a special section devoted to children. Finally, a chapter is devoted to the various laboratory procedures; and in the appendix standards of weight for men, women and children, and a few suggestions about diet are given.

With increasing knowledge of health measures changes will undoubtedly occur in the care of the body and the practice of medicine. And instead of being indifferent to or ignorant of some of the factors that bring about ill health, the people will become educated in the right ways of living. Under these circumstances some of the profession will become counsellors of health and attempt to teach those who seek advice in the measures necessary to maintain the integrity of the body. Then the practice of a counsellor will generally consist of visits from persons, who wish to be sure that they are controlling their health. To give a person full assurance from such a point of view the periodic examination must be exact, thorough, and include all the tests useful in the determination of disease.

TWO SILVER CUPS

WHAT WILL MASSACHUSETTS DO?

WE have an opportunity to compete with other states and other communities in other states for

THE SCHOOL HEALTH SERVICE CUP

"The National Tuberculosis Association, in recognition of the importance of this problem, has offered a beautiful silver cup to the state which reaches the greatest number of children with school health service in proportion to school enrollment. The award will be made on the basis of the number of public, private and parochial school children in each state who have received a physical examination during the school year 1925-1926 by an officially employed school physician or school nurse or by trained authorized workers of volunteer agencies; and on the basis of the extent of the correction of defects made through follow-up service."

THE NUTRITION CUP

"The Child Health Education Service of the National Tuberculosis Association believes that any complete child health program must include definite service for the undernourished child.

The Nutrition Cup will be awarded by the National Tuberculosis Association to the school unit (county, city or district, having a population not less than 10,000) which shall be judged by a national committee to be doing most effective work for the undernourished child.

The main object of this nutrition cup contest is to endeavor to find out to what extent the problem of the undernourished child is being met in each state and how well the facilities available for the care of this group of children are being utilized."—*Massachusetts Tuberculosis League, Special Bulletin!*

DIPHTHERIA PREVENTION

DR. MAHONEY of the Boston Health Department has inaugurated a campaign against dipththeria and is urging the universal use of toxin-antitoxin among young children. An especial appeal is being made to physicians with the expectation that they will instruct parents in the importance of this prophylactic treatment. With the general adoption of this treatment Boston can be made as free of dipththeria as several other cities.

Case Records of the Massachusetts General Hospital

ANTE-MORTEM AND POST-MORTEM RECORDS AS USED IN WEEKLY CLINICO-PATHOLOGICAL EXERCISES

EDITED BY
RICHARD C. CABOT, M.D., AND HUGH CABOT, M.D.
F. M. PAINTER, A.B., ASSISTANT EDITOR

CASE 12231

DEEP PIGMENTATION OF THE SKIN. CAUSE?

MEDICAL DEPARTMENT

An American stationary fireman sixty-six years old entered March 4 complaining of weakness and vomiting of one year's duration. His mother died of "shock." His wife had two children stillborn between her fourth and fifth living children. The patient was very ill with typhoid fever twelve years before admission. Until the past year he had had occasional slight nosebleeds, usually from the right nostril. For ten years he had had hemorrhoids. For many years he had had vague rheumatic pains in the right hip and shoulder. Three years before admission he had an attack of diarrhea lasting two days. In general he had considered himself well and strong until the present illness.

For the past year he had had gradually increasing weakness, vomiting and periodic attacks of pain in the right upper quadrant just under the costal border, definitely localized. It was usually sharp but occasionally dull, and lasted from a few hours to an entire day, rarely extending to a second day. It never occurred at night It had been so severe in the middle of the day that he had to stop work and go to bed. It was not related to meals or to his attacks of vomiting, but was usually relieved by vomiting. It was usually accompanied by eructations of considerable gas and nearly always by tenderness over the painful area. He had had no chills or jaundice. The vomiting occurred just after breakfast, at first occasionally but with increasing frequency until within a few weeks he was vomiting every morning. There was no abdominal pain with the vomiting, but it was usually followed by a vague feeling of discomfort in the epigastrium subsiding in a few minutes. Three months before admission he occasionally vomited after his noon or evening meal. During the past few weeks he had vomited after practically every meal. He could keep nothing down except milk, and that only when it contained a little whiskey. For the past three months he had been unable to work at all. Since the onset he had lost considerable strength. At first he had to take a day or two off every few weeks to rest, and occasionally as much as a week. For the past three months he had been unable to work at all. Two months ago he had frequent attacks of dizziness with buzzing in the ears. For the past month he had been in bed practically all the time. For the past three weeks he had had rapidly increasing brownish pigmentation of the skin.

Examination showed a poorly developed and emaciated man, not acutely ill. There was marked brown pigmentation of the face, forehead, neck, shoulders, forearms, hands, palms, nipples, arms and armpits. The genitals were black. There were pigmented scars on the lower legs and mottled discoloration of the feet. There were small patches of pigmentation on the buccal mucous membrane. The nose showed evidence of recent epistaxis. The teeth were all gone. The motion of the spine was limited. There was marked kyphosis. The chest was barrel shaped. The expansion was almost nil. The breath sounds were faint. Expiration was prolonged. There were no râles. The heart showed no enlargement. The supracardiac dullness was 6 cm. The sounds were faint. The action was regular. There were no murmurs. The blood pressure was 90/55 to 104/80 to 78/63. The radials were thickened, the temporals and brachials tortuous. The artery walls were soft and very compressible. Electrocardiogram showed normal rhythm, rate 100, P-R interval .2 seconds, low potential. The abdomen was scaphoid, with some spasm in the right side. Examination was difficult. There was a questionable mass in the right flank. There was definite costovertebral tenderness on the right and slight tenderness in the right flank. The prostate was moderately enlarged. The dorsalis pedis arteries pulsated. The pupils, reflexes and fundi were normal.

The urine was normal in amount, specific gravity 1.016 to 1.022, a trace of albumin at one of two examinations. The sediment showed 4-6 leucocytes per high power field at both examinations, 2-3 red blood corpuscles at one. The renal function was 30 per cent. Urine was injected into a guinea pig, necropsy of which was negative. Blood examination showed 9,750 leucocytes, 60 per cent. polynuclears, 70 per cent. hemoglobin, 4,220,000 reds, smear normal. Wassermann negative. Non-protein nitrogen 39 mgm. Blood sugar 64. Icteric index 5. Coagulation time: surface clot 4-6 minutes, deep clot 6-7 minutes. Basal metabolic rate +13, pulse 96, weight 55.6 kilos. Sugar tolerance, fasting too low to read, one half hour 144 mgm. per 100 c.c., an hour and a half 194 mgm. per 100 c.c. Blood sugar 84 mgm. per 100 c.c. Sputum showed streptococci and small bacilli, no tubercle bacilli. Stools negative.

X-ray. The heart measurements were within normal limits. The transverse portion of the aorta was slightly prominent to the left, suggesting a small amount of arteriosclerosis. Several small calcified glands at each lung root. The larger lung markings were increased in prominence. The periphery and apices of the chest were clear. The diaphragm was low, the excursion somewhat limited on both sides. The costophrenic angles were clear. The kidney outline was rather indistinct on both sides. No abnormal changes were present. The spine showed slight hypertrophic changes. The internal iliac arteries were visible. The plate of the skull showed no definite change in the outlines or density of the bone. The sella turcica was well within normal limits. There was a malposed and unerupted molar. The pineal glands showed slight calcification.

Examination of the chest was rather unsatisfactory. One house officer found bronchial breathing in front.

March 6 a course of suprarenal extract gr. iii four times a day was started. He was given seven doses by mouth and one intramuscularly. Traube-Herring waves were noted during one examination. The blood sugar rose to 84 mgm. He ate little. The vomiting continued. He grew rapidly worse. March 14 he died.

Discussion

BY RICHARD C. CABOT, M.D.

NOTES ON THE HISTORY

This early history seems to me a very scattering sort of fire, with suggestions in every direction but in no one direction. I come to the present illness with no particular ideas of what is going to show up.

Of course with pain referred to the right upper quadrant we are thinking of gall-bladder disease, and the note about chills and jaundice is introduced with regard to that.

If the statement about pigmentation turns out to be substantiated in the physical examination it will come in as a very important one, because there are few causes of pigmentation of the skin that come in clinical medicine.

In the first place we have a man who has had no significant diseases for sixty-five years, whose illness begins at the age of sixty-five and is characterized by the pain in the region of the gall-bladder, of the colon, of the stomach, or possibly of other organs too, with a good deal of vomiting, with loss of strength and presumably of weight, and with a dizziness more recent than the other symptoms. On the whole, so far as differentiating data are added, they are against gall-bladder disease and in favor of something connected with the gastro-intestinal tract. The whole picture might be due to Addison's disease. He has no symptoms that I have not seen in Addison's disease. Though there is more pain than there usually is in that disease, there is no more pain than we do see. The vomiting is characteristic; the pigmentation is the thing that naturally brings it to mind.

NOTES ON THE PHYSICAL EXAMINATION

"The genitals were black" is a strong phrase. I do not think they were black, I think it means dark brown. These terms of color in medicine are often greatly exaggerated. It is like the "green" of chlorosis and the "sky-blue" sclerotics which nobody ever saw.

Dr. Joseph C. Aub: I should say it was a dark slate-color, and more marked pigmentation than anywhere else in the body.

Dr. Cabot: Whether rightly or not, it is customary in discussing Addison's disease to pay great attention to pigmentation in the mouth, because non-Addisonian pigmentation in the skin is much more common than non-Addisonian pigmentation in the mouth, though in negroes the latter is not of any great importance, because in them we see it from all sorts of causes and no cause at all that I know. But in white people it certainly is rare outside of Addison's disease.

At sixty-six limitation of motion of the spine means nothing.

If percussion had been given I think they would have said "hyperresonance extending over the liver and heart," that is to say the findings of what used to be called "emphysema," which I am getting interested in because we know there is no such thing clinically.

The unusually low blood pressure is a point which cannot help strengthening our belief in Addison's disease. We do see it as low in pernicious anemia, and I suppose in any exhausting disease. But certainly the lowest and most continually low readings that I have seen have been in Addison's.

A mass in the right flank is of course important, because we have had pain there. But it might be a normal kidney for anything that I see here stated. I should say this urine is within normal limits. Of course if there were tuberculosis in the adrenals there might be tuberculosis in the kidneys too, and so we might get evidence there, although I have never happened to see that in Addison's disease.

I am not very clear about the way of measuring icterus index. Up to fifteen is ordinarily taken as normal, isn't it?

Dr. Aub: This is essentially normal I think. The blood sugar is very low.

Dr. Cabot: Doesn't one often see blood sugars as low as this in people who are run down from other causes?

Dr. Aub: I should say not, Dr. Cabot.

Dr. Cabot: I should not have recognized this as extraordinary in any cachectic patient. The coagulation and clotting time and basal metabolism were negative. The sugar tolerance tests are very queer.

Dr. Aub: I do not understand that. In Addison's disease the blood sugar does not usually rise so high. I think "too low to read" meant that the house officer did not take it to the laboratory in time and a good deal was lost.

A Physician: It is a typical diabetic curve.

Dr. Cabot: Yes. The typical blood sugar curve in Addison's is one that hardly ever reaches normal. Have we the X-ray plates here?

Dr. John D. Camp: The transverse portion of the aortic knob is a little prominent to the left, enough to suggest a slight amount of arteriosclerosis. The lung markings are a little thickened, but perhaps not markedly for a man of this age. There are a few small calcified glands, remnants of an old tuberculous gland infection. Other than that I do not see anything remarkable in the chest. We had some films of the urinary tract which showed nothing particular except calcification of the arteries in the pelvis and also some peripheral changes about the margins of the lumbar vertebrae which we associate with so-called hypertrophic arthritis. Addison's disease has been mentioned. The question might be raised, what should we expect to see in Addison's? I recall one case of Addison's disease where we showed calcification of both adrenals. It is the only case I have ever seen. I do not remember hearing of another similar case. Perhaps that is what they were looking for. The films of the skull showed practically nothing. There was some calcification of the pineal gland, which is without significance.

Dr. Cabot: Most of the adrenals that I have seen at necropsy with Addison's have been caseous and not calcified. We will ask Dr. Richardson about that in a moment.

DIFFERENTIAL DIAGNOSIS

The thing that strikes me here is that in the hospital he does not talk about pain. There was so much before he came in and none after.

Dr. Aub: He was very ill.

Dr. Cabot: Do you suppose it was because he was too ill to complain?

Dr. Aub: I do not think so.

Dr. Cabot: In the differential diagnosis previous to coming here we are bothered because there is a little suggestion of pain in the right flank, and of course one could not get pain from Addison's, but with the painless course followed here in the hospital it does not bother us. I recollect a great many histories like this, (but not of Addison's,) where pain has been complained of a great deal outside the hospital. When these patients come here, whether because of different interpretation of what was "pain" or because it straightens itself out, we do not hear of it. That is one reason why hospital diagnoses are better than out-patient or office diagnoses.

Dr. Aub: Isn't gastro-intestinal pain apt to disappear when the patient gets to rest, just as diarrhea does?

Dr. Cabot: Certainly that is by no means true of all the ulcers or cancers. They often do get better, it is true.

Looking back on this it seems to me that most of the facts point to Addison's disease. The pigmentation is not the kind that could possibly be due to sunburn or to vagabond's disease or to pellagra or to any of the other things that we bring up when we are discussing pigmentation. There is no evidence of Hodgkin's or of thyroid disease, which may give us pigmentation. He comes to us in the end of winter. He is not likely to have been exposed to the sun, and the pigmentation is in situations where it would not reach. So we are inclined to take that seriously. What goes with that in Addison's? Gastro-intestinal symptoms, heart symptoms, low blood pressure. He has no striking heart symptoms. The findings which are so often present in connection with a low blood pressure, the extreme weakness and fainting, are not dwelt upon if they are here. But he does have the unexplained vomiting which we often see, and which I do not know of any satisfactory explanation for. I should be glad to know if Dr. Aub knows anything about the cause of vomiting in Addison's disease. I suppose it is of the type of which we like to cover up our ignorance by calling it toxic.

Have we any good reason to consider any further gastro-intestinal malignant disease here? I do not see that we have. We have no gastro-intestinal X-ray because he did not have much in the way of gastro-intestinal symptoms, and his symptoms have never been suggestive of anything except cancer of the stomach. He would not have died of cancer of the stomach with so little emaciation and anemia. There is no evidence of hemorrhage or perforation. He is not starved to death. I should say the main evidence against it is that he died. If he had not died we might have had to worry more over the possibility of cancer, although the pigmentation would steer us in another direction.

As he has the clinical evidence of emphysema I shall predict that he will not show it at necropsy. The heart is pretty clearly shown to be all right. There is no evidence against the kidneys that I see, or against the gastro-intestinal tract. So I think this ought to be the necropsy of an old man with about the amount of arteriosclerosis common at sixty-six and nothing else except the lesions in the adrenals which we know are more often due to tuberculosis in the caseous stage than to anything else. Some old tuberculosis in the lungs would not be surprising, but I feel confident that there is nothing active there.

Dr. Aub, won't you add anything that is of interest?

Dr. Aub: I think you have stated everything. There are one or two things on the laboratory side that puzzled me. Of course the low blood sugar is very characteristic and to my mind one of the best evidences for diagnosis, but I think the sugar curve is unusual. The basal metabolism rate of +13% is, I think, partly due to the fact that it is his first determination. It is usually found to be less than normal in Addison's disease.

I am always interested in the length of time they can maintain a low blood pressure—below eighty for days—and not suffer from it; whereas a person who gets a low pressure acutely would show great signs of shock.

Dr. Cabot: We see the same thing in pernicious anemia, where it comes on gradually I suppose and they get used to it. Is there any explanation of the low blood sugar?

Dr. Aub: None, except I suppose that the adrenals are a good mechanism for liberating glycogen. It is a quite common observation in these late cases. I do not know why they all have gastro-intestinal upsets, but they all have them.

Dr. Cabot: I meant to ask you whether there is anything to be said about the vomiting.

Dr. Aub: In necropsies in animals and men we usually find the gastro-intestinal tract very tightly constricted. They all have a great tendency to vomiting and to diarrhea.

Dr. Bock: We had one patient who came in with a diagnosis of gall-stones, was in the hospital for a day or two and suddenly died. She had Addison's disease with very marked caseation and pains in the right upper quadrant.

Dr. Cabot: Had you any idea of the cause of the pains?

Dr. Bock: No.

Dr. Cabot: Was there a good deal of pigmentation?

Dr. Bock: No. There were a few spots, I think, one or two on the abdomen, and I think that was all.

Dr. Aub: There are some cases in the French literature where the whole history covers only a few days, where at death there is complete caseation of both adrenals.

Dr. Cabot: That is, there seems to have been until the very end some compensatory process going on.

A Physician: Why do they have back pains? It is a very common symptom.

Dr. Cabot: I have no idea. I did not know that. I suppose the orthopedic people might say it was the general relaxation and weakness leading to some strain or displacement.

Dr. Bock: This electrocardiographic report is significant I think.

Dr. Cabot: Isn't that due to low blood pressure?

Dr. Bock: I think it is due to very weak heart muscle, because we see it chiefly clinically in coronary thrombosis. It may mean nothing more here than low blood pressure.

Dr. Cabot: I had supposed that it was another way of saying the same thing, but I am glad to get the other interpretation.

CLINICAL DIAGNOSIS (FROM HOSPITAL RECORD)

Addison's disease.

DR. RICHARD C. CABOT'S DIAGNOSIS

Addison's disease.
Arteriosclerosis.

ANATOMICAL DIAGNOSIS

1. *Primary fatal lesions*

Tuberculosis of the adrenals with pigmentation of the skin (Addison's disease).

2. *Secondary or terminal lesions*

Edema of the lungs.

3. *Historical landmarks*

Slight chronic pericarditis.
Slight dilatation of the heart.
Slight chronic perihepatitis.
Chronic pleuritis, right.
Obsolete tuberculosis of the bronchial glands.
Tubercles in the liver, spleen, and retroperitoneal lymph glands.

Dr. Richardson: This case showed a typical picture anatomically of Addison's disease. The skin was a very dark bronze brown, especially in the places mentioned. In other places of course it was lighter. There was a fair amount of subcutaneous fat. The peritoneal cavity and gastro-intestinal tract were negative except that the mucosa was flat and pale and the small and large intestines rather empty.

Dr. Cabot: Did you see anything in the gastro-intestinal tract to explain his vomiting?

Dr. Richardson: No. The mesenteric glands were negative. One or two of the retroperitoneal glands were slightly enlarged, and we found a few tubercles in those.

There were a few pleural adhesions on the right, none on the left. The bronchial glands were slightly enlarged and some of them showed fibrocalcareous degeneration. These glands showed tuberculosis in its oldest aspect in the body. The lungs showed negative apices, no areas of consolidation. The tissue showed much edema.

In the pericardium were a few scattered old adhesions. The heart weighed 310 grams. The myocardium was flabby and rather pale and thin—two mm. on the right, ten mm. on the left—and was slightly dilated on each side. The valves were negative except that their circumferences were rather large: the mitral eleven centimeters, the tricuspid fourteen centimeters, the pulmonary eight and a half centimeters.

He had very little arteriosclerosis, so slight that it is not considered enough to go into the anatomical diagnosis.

The liver weighed 1028 grams; that is rather small. There were a few old adhesions to the diaphragm. We could see places where the tissue was a little granular. Under the microscope these showed that there were a few tubercles present.

The gall-bladder and bile ducts were negative. The pancreas showed slight fatty infiltration. The spleen weighed ninety grams—small—and showed a number of rather large tubercles on the surface and questionable tubercles in some places in the substance. Microscopically we found some, but not so many as we expected. The adrenals were enlarged on each side, one weighing twenty-nine, the other thirty-two grams. They showed fibrocaseous degeneration to such an extent that it was quite difficult to see any definite adrenal tissue.

The kidneys weighed 230 grams and were negative macroscopically and microscopically.

The tuberculosis was distributed rather peculiarly, as it is apt to be in Addison's. Here the oldest point was in the bronchial glands, and the next oldest looking tuberculous masses were the large tubercles on the surface of the spleen. Then came the fibrocaseous degeneration of the adrenals.

Did you say there was a pig inoculated?

Dr. Aub: Apparently.

Dr. Richardson: I wonder why they did not inoculate the blood.

Dr. Cabot: Do you think the amount of tuberculosis in his spleen and elsewhere outside the adrenals would have done him any harm if he had not had it in the adrenals?

Dr. Richardson: Apparently not.

Dr. Aub: Would you say there was any question about that sort of lesion being tuberculosis?

Dr. Richardson: No.

Dr. Aub: It is so surprising that it should hit the adrenals and nothing else.

Dr. Richardson: Of course in another case you might find more tuberculosis elsewhere.

Dr. Cabot: It seems to me that we have to say that the appetite of the tubercle bacillus is capricious. It likes to eat suprarenals better than many other organs. We remember that Pasteur found that the penicillium glaucum was much fonder of right-handed crystals in the tartaric acid that he was studying than it was of the left-handed ones, or vice versa. So that he could separate one from the other by putting this mould into an optically neutral acid (racemic). The mould would not eat any of the left-handed until it had eaten up all of the right-handed crystals, or whichever it was. I have forgotten. It seems to me we have to suppose such a selective appetite in some strains of tubercle bacilli.

Dr. Richardson: It is a curious thing that this man should be so well for sixty-five years.

A Physician: Did you find any evidence of emphysema?

Dr. Richardson: No, there was no emphysema.

Dr. Bock: I should like to ask Dr. Cabot what is the disease which clinically is called emphysema.

Dr. Cabot: I think it is a disease of the bones, found oftenest in old people. We cannot imagine the lungs shoving out the chest the way we have always assumed they did.

Dr. Bock: But we do see this in young people. We have had one man of twenty-eight this year with all the clinical picture of emphysema and nothing whatever to account for it.

Dr. Cabot: I do not mean to say that it occurs only in old people, but we see a vast number of elderly folks with this shaped chest. We find emphysema of the lungs post-mortem sometimes, but when we find it there haven't been any symptoms or signs usually. We have gone back over the necropsies lately with reference to this. So I think that for various reasons that I don't know anything about people get changes in the shape of the chest and that gives rise to all sorts of clinical signs hitherto supposed to be linked with pulmonary emphysema.

Dr. Aub: But Scott showed a high alveolar air and a high CO_2 combining power in the blood. It is hard to explain that, isn't it? Don't you think this implies something wrong in the function of the lungs?

Dr. Cabot: I can imagine something very wrong functionally with the lungs without any of the anatomical changes which constitute emphysema,—the tearing and breaking of the alveoli and so on.

Dr. Bock: It seems to me the condition as we see it is more apt to be primary in the lung than in the bony structure in which the lung is enclosed.

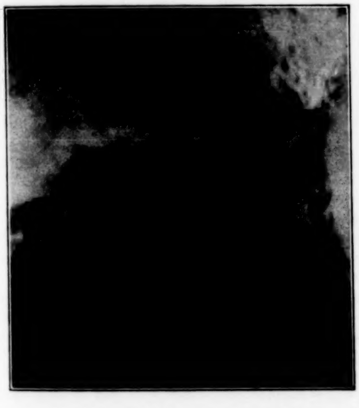
Dr. Cabot: I have nothing to say except the necropsy facts, which are to me absolutely conclusive. I am going to publish them soon. We have taken all the cases which were called emphysema during life and found most of them to have no emphysema post-mortem. Then we took it the other way, all the cases in which Dr. Richardson found emphysema, and went back to the clinical record and they did not show it. So we have checked it in two ways. In only a few cases we got the diagnosis right, about ten per cent. I think.

CASE 12232

RECURRENT GASTRIC ULCER WITH POST-OPERATIVE HEMORRHAGE

Surgical Department

A French Canadian railway car inspector thirty-nine years old entered for the first time January 21, fourteen months before his second admission, complaining of epigastric pain of two years' duration. He had rheumatism in the knees and shoulders for five years beginning ten years ago. Years ago he was troubled with cough, worse in the morning, with a good deal of thick sputum. He had soft chancre ten years ago, and gonorrhea nine years ago. He had influenza during an epidemic. He had occasional headaches, nosebleed, and head colds. Until a year ago he took about two quarts of alcohol a week and was often intoxicated. For the past year he had taken only about a quart a month.



Just below the middle of the lesser curvature is a definite projection from the gastric shadow. There was tenderness over this region. The sphincter and duodenum are regular. The remainder of the tract is not remarkable.

For the past two years he had been troubled with sharp gnawing pain sharply localized to the left of the xiphoid, lasting two or three hours at a time unless he relieved it with bromoseltzer, "black pills", some other mild cathartic, or food. The bromoseltzer caused him to belch gas with relief. The pain came on two or three hours after the noon meal, occasionally a few hours after supper. Recently it had been steadier. Occasionally he had free periods, but these had grown steadily shorter, so that now he had pain every day. Two or three times a month the pain awakened him at night. For the past few months his bowels had been constipated. A month ago after taking a drink of alcohol he vomited. Two weeks ago while working he found that he was dizzy on rising after stooping. He had urinated once at night and eight times during the day for the past month. Before that he urinated five or six times a day and once or not at all at night. He had lost about ten pounds in two years.

X-ray examination in the Out-Patient Department January 11 showed the stomach empty in normal time. Peristalsis was rather active. Just below the middle of the lesser curvature was a definite projection from the gastric shadow. There was tenderness over this region. The sphincter and duodenum were regular. The remainder of the tract was not remarkable.

Examination showed a well nourished man walking about the ward. Most of the upper teeth were missing. There were several small glands above the clavicle, bilateral epitrochlears about three-quarters of a centimeter in diameter, inguinal glands one to one and a half centimeters. The apex impulse of the heart was not found. The left border of dullness was one centimeter inside the midclavicular line. The examination was otherwise negative.

Before operation the urine was normal except for occasional leucocytes at two of three sediment examinations and red blood cells at one. Blood examination showed 7,800 leucocytes, 72 per cent. polynuclears, 85 per cent. hemoglobin, reds and platelets normal. Wassermann negative. Non-protein nitrogen 36.8 mgm. Stools negative.

January 24 operation was done. Four days later the patient had slight cough with a small amount of bright blood in the sputum. There was a patch of dullness with diminished breath sounds below the angle of the right scapula. A few sonorous râles were heard at the right apex in front. A portable X-ray plate showed practically complete dullness on the right. This side of the chest was not completely shown on the plate. The border of the heart on the right could be seen faintly, but the diaphragm was not visible. The plate showed apparent displacement of the midshadow in this direction. This was thought however probably not to be real but due to the rotation of the patient. The findings were not entirely satisfactory, but as far as could be seen suggested either consolidation or fluid on the right side. The absence of displacement of the heart from the left was rather contrary to the existence of any large amount of fluid on the other side.

The patient made a good convalescence. Gastric analysis February 7 gave 75 c.c. of fasting contents, no free HCl, total acid 10. The test meal showed no free HCl, total acid 15. The hemoglobin was 85 per cent. February 8 the patient was discharged to the Gastro-Intestinal Clinic.

He did well for six months on a five-meal diet. He then began to have epigastric pain an hour or two after each meal, relieved by food or soda. He noticed a very little blood in his stools on a few occasions, due he believed to hemorrhoids. He felt better when his bowels moved regularly. They were constipated from the time of his operation, requiring daily cathartics. He did not lose weight or strength, though his condition progressed in spite of adherence to diet. He was seen in the Gastro-Intestinal Clinic of the Out-Patient Department January 5 and February 9, 1926. It was thought the case would be a very difficult one to manage in an Out-Patient Department.

X-rays taken January 19 without a motor meal and after antispasmodics showed the stomach low and peristalsis sluggish. On the lesser curvature of the incisura angulares was a very small shadow of increased density which projected from the gastric contour. This area was present at both examinations. There was tenderness directly over it. After a motor meal there was a trace of barium in the stomach at the end of six hours. There was a moderate degree of pyloric spasm. The first portion of the duodenum appeared normal in contour. The six hour meal had reached the terminal ileum.

February 9 the patient was referred from the Gastro-Intestinal Clinic to the wards for operation.

On examination in the wards he was fairly well nourished, in no pain and not acutely ill. The examination was negative except for the operative scar, a few external hemorrhoidal tabs, and an enlarged but not hard or irregular prostate.

Before operation the blood was not recorded; the urine and chart were not remarkable. Gastric analysis gave 50 c.c. of fasting contents, free acidity 0, combined acidity 10; test meal 90 c.c., free acidity 7, combined acidity 20, guaiac slightly positive.

March 5 operation was done. The patient vomited some blood before leaving the amphitheater, and after reaching the ward continued to vomit bright blood until the condition became alarming and he was taken back to the amphitheater. After a second operation, followed by transfusion of 700 c.c. of blood, he returned to the ward in good condition, had no further bleeding, made a remarkable recovery from operation and continued to gain well. March 11 the transfusion wound was swollen. It was probed and serum was obtained, and one drop of pus at the stitch. Hot poultices and hot packs were necessary. By the fifteenth the arm was very much better. The patient was given Blaud's pills and combined anemia and gastric diet. March 20 he was discharged to the Out-Patient Department feeling well.

He was seen in the Out-Patient Gastro-Intestinal Clinic April 6. He was having no pain, gas, or heartburn. His bowels were costive unless he took Russian oil or "salts." He had slight nausea about fifteen minutes after breakfast, but no vomiting. He was weak but gaining rapidly. The hemoglobin was 65 per cent.

Discussion

BY EDWARD P. RICHARDSON, M.D.

His rheumatism and cough had no bearing, I think, on his present illness.

This story of pain in the epigastrium occurring two or three hours after meals, with definite relation to meals, and with occasional free periods, is very suggestive of peptic ulcer, and I should not myself assign any causal relation between the alcohol and the peptic ulcer. It is a history suggestive of peptic ulcer in a young man who had been definitely alcoholic.

Dr. Holmes, do you wish to discuss the X-ray plates?

Dr. Holmes: I would not attempt to interpret this from the plates. I should want to know the fluoroscopic examination.

Dr. Richardson: That in itself would give a diagnosis of gastric ulcer without much doubt?

Dr. Holmes: I think so.

Dr. Richardson: Is there anything else that would simulate it so far as the X-ray findings go?

Dr. Holmes: Hardly. The thing we mistake for ulcer most often is cancer. I do not believe cancer would give a definite projection of this kind.

Dr. Richardson: The physical examination was essentially negative, the blood and urine also negative, the Wassermann negative. I think that is interesting in a man with some history of venereal disease who comes in complaining of stomach symptoms. This type of lesion would not appeal to you as lues of the stomach?

Dr. William D. Smith: No. The story seems characteristic enough of peptic ulcer.

Dr. Richardson: The non-protein nitrogen was normal. The stools were negative. Gastric analysis was not done before operation. I think the reliance we place on X-ray examination is too apt to make people consider that gastric analysis is perhaps a little superfluous.

Dr. Smith: I don't think it is done nearly as much outside as it used to be. We always do it on the medical side, regardless of X-ray findings.

Dr. Richardson: I think it is extremely interesting to compare the findings in gastric acidity before and after operation. Gastric analysis is surely valuable in obscure cases.

The question in this case is not diagnosis but treatment. Here we have an alcoholic man of thirty-nine with a definite gastric ulcer. I am inclined to believe that medical treatment is more likely to be advised now than it was two or three years ago at the patient's first entry to the hospital. That is my observation from the way cases come in for operation. But obviously this man was a difficult one to control, and so surgery was decided upon.

PRE-OPERATIVE DIAGNOSIS, FIRST ADMISSION

Penetrating ulcer of lesser curvature.

OPERATION, FIRST ADMISSION

Gas-ether. Right rectus muscle splitting incision. High up on the lesser curvature on the posterior wall of the stomach in the center of an indurated area about 3 cm. in diameter a deep ulcer a centimeter in diameter was palpated. Clamps were applied to the vessels surrounding the indurated area, which was then excised.

PATHOLOGICAL REPORT JANUARY 24

An area of gastric wall showing a deep ulcer in the mucous membrane measuring 1.2 cm. in diameter, with smooth margins.

Microscopic examination shows the surface of the ulcer covered with necrotic cellular exudate. The base is composed of scar tissue which extends through the muscular coats. There is no atypicality of the gland tubules or their lining epithelium at the margin.

Chronic ulcer.

Further Discussion

He had, four days after operation, signs of post-operative pneumonia. Otherwise he had a good convalescence. Post-operative pneumonia is one of the particular dangers after operations in the upper abdomen, one of the principal sources of mortality. We see however a good many cases of post-operative pneumonia which are atypical and do not run a severe course. I think diagnosis in these cases depends in large measure on the interest of the house officer and the staff, and the frequency with which X-rays of the chest are done.

Dr. Holmes: How many of those do you think are embolic—a large percentage or only a few?

Dr. Richardson: I am inclined to think only a few are embolic. When we have embolism of any considerable magnitude following operation there usually are present definite symptoms, that is, a sudden onset, distress, the development of pleuritic pain and friction rub, and also in most cases they are liable to occur later than the usual post-operative pneumonia. I am inclined to think that pneumonias occur more probably in relation to lowered resistance and interference with breathing on account of the operative wound and the swathe. In these upper abdominal incisions there is marked interference with breathing, more marked than with operations in other regions of the body. I do not know that this is much of a factor, beyond interfering with their freedom of expectoration. But I think that most pneumonias come down from above and are not embolic; and it is certainly true that if a barium mixture is put into a dog's mouth and the dog etherized, the barium mixture is spread all through the bronchial tree. Add to that vitality much reduced, and it seems to me we have all the factors for pneumonia. Fortunately most of them improve and do not figure much in the convalescence.

These are the X-ray plates. This was the consolidation, was it?

Dr. Holmes: Yes. I think that is rather characteristic of bronchopneumonia. It does not at all suggest infarct or massive collapse. There is not enough in the plates of the stomach for me to draw any conclusions except the crater of the ulcer, of course, is not visible now, and in this plate the first portion of the duodenum is not visible, but that may have just happened.

Dr. Richardson: This patient apparently had as good medical treatment as could be arranged for him under the circumstances, and only came into the hospital a second time when in spite of supervision it was obvious that he could not get along. The X-ray and his symptoms are both in agreement that he had a recurrence of his gastric ulcer.

The examination in the wards was essentially negative. But this patient had a very definite hypoacidity, and in spite of that fact he had a recurrence of his ulcer symptoms.

Dr. Smith: Did he have soda relief the second time? It would be interesting to know if with his low acidity he had the same relief that he had before.

Dr. Richardson: That is not stated here. It might appear in the records of the Gastro-Intestinal Clinic. We had no gastric analysis in his first record to compare with. We have however analysis after his discharge.

Miss Painter: The history of the interval after discharge gives a statement that the pain was relieved by soda.

Dr. Richardson: That answers the question.

Dr. Smith: I think that is very interesting, that when analysis showed him absolutely free from hydrochloric acid the pain is relieved by soda just the same.

Dr. Richardson: So far as our evidence goes he had a low acidity at the time of admission, and still he reformed the gastric ulcer. I believe it to be true that although in the majority of cases we have a high acidity, in a certain proportion, perhaps approaching a quarter, we have a low acidity in gastric ulcer, and this happens to be one of those cases.

It seemed clear that a second operation was indicated. In regard to the first operation, I think at the present time it would be considered inadequate to cut out an ulcer, sew up the stomach, and do nothing else. In gastric ulcer we like to attack the ulcer directly because there may be malignancy at the time of operation, and malignancy may develop later in the scar in a small proportion of cases. But I do not think that is enough. I think in addition a gastroenterostomy would be desirable, particularly in cases of hyperacidity. It does three things: (1) It removes tension within the stomach. (2) It tends to reduce acidity. That is not important in this case because the acid is low. (3) In the third place, it reduces trauma. I do not think that is particularly important in itself, but I do think that the combination of the reduction of intragastric tension of acidity and of trauma does make some difference.

The question was what to do at the second operation, and it seemed reasonable, with recurrence of symptoms, to remove the whole ulcer-bearing area, that is the pyloric region and the greater part of the lesser curvature.

PRE-OPERATIVE DIAGNOSIS, SECOND ADMISSION

Recurrent gastric ulcer.

FIRST OPERATION, SECOND ADMISSION

Gas-ether. Median incision, exposing a large stomach. On the lesser curvature about three inches above the pylorus was an indurated ulcer. In view of the recurrence after the previous operation partial gastrectomy was decided upon. There were extensive adhesions from the original operation around the pyloric end of the stomach. These were freed. The vessels of the greater and lesser omentum were tied off, the duodenum cut across 1 cm. beyond the pylorus, sewed over and inverted. The stomach was clamped above the lesion with crushing clamps, and back and forth sutures below the clamps. The stomach was then removed. Over and over suture along the cut end of the stomach, buried by seroserous stitch. Posterior gastro-enterostomy was then done. The intestine ran from right to left. The usual closure.

PATHOLOGICAL REPORT MARCH 5

A cuff-shaped section of stomach containing a small deep ulceration in its mucous surface 1 cm. in diameter.

Microscopical examination shows an ulcer whose fibrous base extends through the stomach wall. There is no atypicality of the epithelium at its margins.

Chronic ulcer.

FURTHER DISCUSSION

The whole tendency in gastric surgery, particularly on the continent, is towards more radical operation. I feel that the results of gastroenterostomy and more limited procedures are sufficiently good so that this radical type of operation is not justified save under exceptional conditions, or possibly in exceptional clinics. But here is a man who had recurrence of the ulcer, and so it seemed reasonable to take out the pyloric end of his stomach. Having done that, the question was how to restore the stomach so that it would function. This operation is the Billroth II pylorectomy, and has given good functional results. I think the tendency is now to join the cut end of the stomach directly to the duodenum and so have a more normal physiological arrangement. I do not feel that in results there are great differences as yet demonstrated. It is chiefly a question of familiarity with the technique.

After the operation he vomited two or three pus-basins of blood. The hemorrhage was active and progressive, and at the same time his general condition was not greatly affected. He had a pulse of about 120; his systolic blood pressure had only dropped to 100. It seemed obvious that he could be carried through an operative procedure. The question was whether to trust to morphia and rest or to take him down and attempt to control his bleeding. We felt that we could get a donor by the time the operation was completed, and under the circumstances it seemed safer to control the hemorrhage than to give morphia and take a chance.

PRE-OPERATIVE DIAGNOSIS, SECOND ADMISSION

Intragastric hemorrhage following pyloric resection.

SECOND OPERATION, SECOND ADMISSION

Ethylene. The wound was reopened. There was no hemorrhage into the peritoneal cavity. Three inch incision through the gastric wall half way between the greater curvature and the closed end of the stomach. The stomach was full of fresh blood and clots, possibly 500 c.c. The mucous membrane had been crushed off by crushing clamps and retracted so that it was not held by the suture. The bleeding came from this mucous membrane about the middle of the cut end of the stomach. The suture line was whipped over from within, thus controlling the hemorrhage. The gastro-enterostomy stoma margins were also whipped over. The wound in the stomach was closed by continuous and inverting sutures. The wound was closed without drainage.

FURTHER DISCUSSION

Ethylene gas produces anesthesia with little change in blood pressure, somewhat deeper and more satisfactory than nitrous oxide.

The question was how to get at the bleeding inside the stomach. If we undo the suture lines of a previous operation we have a very long and tedious procedure and are very likely to overlook a hemorrhage. The short way was to cut through the anterior wall of the stomach between the suture line and the greater curvature, then take the left hand and invert.

What had happened in this case was that a heavy crushing clamp (Payr) was applied, squeezed down with great force, the mucous membrane was cut through and immediately retracted. Then when the sutures were passed they did not include the mucous membrane but the muscular and serous coats only, and so it began to bleed when the patient went back to the ward. That represents one of the dangers of these heavy crushing clamps.

Dr. Young just told me that he saw this patient last Tuesday, and that he still continues to gain. Of course he may well develop a gastro-jejunal ulcer in his gastro-enterostomy stoma. I want to emphasize a dangerous technique and to call attention to the means of getting at the bleeding-point in the stomach following operation.

DIAGNOSIS

Recurrent gastric ulcer.
Post-operative hemorrhage from the suture line following partial gastric resection.

CASE 12233

AN IMPORTANT COMPLICATION OF ACUTE APPENDICITIS

Surgical Department

An American boy of seventeen, a carpenter's helper, entered September 25 complaining of pain in the epigastrium and right upper quadrant with some tenderness. He had always been quite healthy; his past history was essentially negative.

A month and a half before admission he was suddenly taken ill with pain in the right lower quadrant associated with nausea and vomiting. During the first twenty-four hours the pain grew worse, tenderness in this region increased, and he had a definite chill which lasted for a few minutes, with a temperature of 102.5° and a leucocytosis of about 16,000. He was taken to a hospital, where an emergency operation was done and according to his physician an acute appendix was found. He made an uneventful convalescence and went home in two weeks. After ten days he again began to have malaise, and to run a temperature above 101°. There were no other definite localizing signs except pain in the epigastrium and the right upper quadrant, with nausea and anorexia but no vomiting. He continued to run a septic temperature with but little else until the first or second week in September, when he began to develop tenderness over the right lobe of the liver in the side and back. Laboratory reports on the blood and the spinal fluid were negative. The urine was negative. There were no gastro-intestinal, cardio-respiratory or genito-urinary symptoms. The temperature continued to rise and the tenderness in the right upper quadrant and the right side and back to increase.

Examination showed a rather pale, thin boy with flushed cheeks. The heart and lungs were normal. There was slight involuntary spasm of the right rectus muscle. The liver edge was felt on deep inspiration; there was some tenderness on deep pressure. There was acute tenderness on pressure over the border of the right lower ribs and in the flank and at the outer end of the lower border of the twelfth rib, right. There was some fullness over the right lower chest. Otherwise the abdomen was essentially negative. The appendix scar in the right lower quadrant was well healed.

X-rays showed the diaphragm rather high on the right, sharply outlined. The right chest was slightly less radiant than the left in its lower part. The shadow below the diaphragm on the right was of even density throughout.

The urine and blood before operation are not recorded.

At entrance the temperature was 103.5°, the pulse 110, falling respectively to 99.8° and 80 the next morning. The respiration was not remarkable.

September 26 operation was done. The next day the patient felt better. The temperature was falling. There was profuse drainage of pus, which decreased in the next two days. He continued to run a temperature of 99.6° to 102.8° for the following six days, with a pulse of 90-120. Moderate drainage from the wound continued. October 3 about 6 c.c. of pus was obtained from the lower portion of the wound. Culture from this pus showed a profuse growth of staphylococcus aureus. After this the temperature was lower, 98°-100°. After October 7 it was not elevated. A Miller wick was inserted October 7 and replaced October 9 and 14. October 14 X-ray showed slight increase in the prominence of the root shadows on each side. The lung fields however appeared normal. Excursion on the right was slightly limited. There was no definite evidence of pathology in the lung field. October 16 the Miller wick was out. October 17 the patient was discharged relieved.

Discussion

BY ARTHUR W. ALLEN, M.D.

This is a pretty typical Surgical Department history. There are many things that are noted by various members of the surgical staff visiting these patients that do not get in the records through our own fault, simply because we do not take the trouble to write them and the house officers frequently forget to put them in. Perhaps I can supplement this history somewhat, as I remember this case very well.

His doctor who came in here with him said there was no question about the diagnosis, that he had a definite acute appendicitis. The appendix was removed without difficulty and without drainage. The appendix was not ruptured; it was simply red and swollen. He made an absolutely uneventful convalescence during his hospital stay and was discharged from that hospital at the end of about two weeks, went home, and was convalescing perfectly normally until about ten days after his return home. At this time he had temperature, especially in the evening. He had no very definite physical signs to go with it. His physician saw him every day and examined him, and it was not until about five weeks after his operation and three after his return home that the physician noticed that there was some tenderness of the right upper quadrant and the boy began to complain of some discomfort in this region. The day before admission the boy was seen in consultation by a member of the staff of this hospital, who felt that he should be sent into the hospital for further study and possibly for further operation. Before he came in he had rather extensive laboratory examinations, which were checked up here

He had a high leucocyte count. He had a negative spinal fluid. His urine was negative. He had no gastro-intestinal, cardio-respiratory or genito-urinary symptoms except that he had definite lack of appetite and there was at times some nausea.

There was a definite appearance of fullness on the right side. I noticed that there seemed to be some edema, almost an inflammatory appearance, over the right costovertebral angle. I remember very distinctly that the blood count was repeated here and was found to be about 16,000 or 17,000. The urine also was negative. The appendix scar was well healed and there was no inflammation in that immediate vicinity. There was no evidence of any mass near the operation or in the left lower quadrant.

The question of the diagnosis was one that in this particular case seemed very clear cut. One of the reasons for selecting this case is because we have so many cases of this same character, of this same lesion, where the diagnosis is very difficult to make.

Here is a boy who has had an operation for an acute appendix six weeks prior to his admission. He comes in with a high temperature, leucocytosis, pain and tenderness in the right upper quadrant, with the positive X-ray findings of a high diaphragm and a mass below the diaphragm. No mention is made here of an air bubble between the diaphragm and the dome of the liver, although in this condition that is frequently seen. The edema over the right lower chest is very characteristic. The condition that is most often mistaken for this lesion is pneumonia, and in nearly all of the cases pneumonia is the diagnosis made until the X-ray shows that the lung is clear. Frequently I think there is a density in the X-ray picture above the diaphragm in these cases, and that is usually due to fluid which forms in the pleural cavity above the diaphragm in an inflammatory process existing below the diaphragm. The diagnosis was definitely established in this case as that of a subdiaphragmatic abscess.

Dr. Horace K. Sowles: Was an exploratory needle put in?

Dr. Allen: We usually put in an exploratory needle. This is advocated by some authorities and not by others, because putting in a needle, although in doubtful cases I believe is justifiable, in clear-cut cases should not be done, as there is a chance of doing harm.

Dr. Sowles: I think so too, as it is very difficult to stick a needle in without going through the edge of the pleura.

INTERPRETATION OF X-RAYS

No evidence of pathology in the chest. The high position and sharp outline of the diaphragm are suggestive of subdiaphragmatic abscess.

PRE-OPERATIVE DIAGNOSIS

Subphrenic abscess.

OPERATION

Ethylene-oxygen. An incision was made over the twelfth rib, which was removed in its entirety subperiosteally. The tissue underneath the rib was about half an inch thick with edema. This was incised, breaking into an abscess cavity containing thick yellow pus. The top of the liver could be palpated with the finger, being adherent around the cavity in all directions. A cigarette wick was inserted and the wound partially closed.

BACTERIOLOGICAL REPORT

Pus from subphrenic abscess shows a profuse growth of staphylococcus aureus.

Further Discussion

Dr. Allen: The twelfth rib was excised in its entirety. Just below the border of the eleventh rib the diaphragm was found to be very edematous. The soft tissue there normally only an eighth of an inch thick. In this case it was three-fourths of an inch thick, very dense, and when that was finally broken through the liver was easily palpable, and following up along the edge of the liver a large abscess cavity was broken into. A cigarette wick was placed over the dome of the liver. The wound was partially closed. He made a perfectly uneventful convalescence. He was discharged on October 17.

Subdiaphragmatic or subphrenic abscess is a comparatively infrequent complication of appendicitis. In a long series of cases that have been reported the average incidence is between three-tenths and four-tenths of one per cent., in other words, three or four out of a thousand following acute appendicitis. Strangely enough, the organism is very seldom the colon bacillus. That was a surprise to me. Only one out of twelve cases recently reported showed a colon bacillus infection. Nearly all of them are staphylococcus aureus, as was true in this case.

That brings about the question of how these subdiaphragmatic abscesses form. There are very distinctly two schools on that subject. There are authorities who believe that subdiaphragmatic abscess is secondary to a liver abscess and that the liver abscess breaks through the cortex of the liver and forms this abscess underneath the diaphragm. Fortunately it is a good deal more common on the right. It occasionally occurs on the left. There are apparently four distinct portals of entry, the portal vein being probably the most common, the hepatic artery being a definite source, the lymphatics being another and the biliary ducts being a fourth. And that is the only classification that the men who believe that all of them are primarily liver abscesses will concede. There seems to be a considerable amount of evidence, however, that a certain number of these cases may form by direct extension. It is very easy to see how infection can travel up the outer surface of the cecum and get above the liver. In a great many of these acute inflammatory processes that occur in the abdomen there must be a certain amount of generalized infection. There is no question but that certain pelvic inflammatory conditions will produce a mild irritation above the liver and cause a mild perihepatitis. These conditions from salpingitis apparently never produce abscesses. There seems to be no way to explain their occurrence except by direct extension. There is no lymphatic connection and no vascular connection.

It has been demonstrated on more than one occasion that infection can be handled by the liver in a surprisingly satisfactory manner, that bacteria getting into the liver substance are killed and perhaps liver infections following other inflammatory conditions in the abdomen are very common, and that in most of the cases the infection is taken care of by the liver cells. That is true of the other organs of the body, but not to such an extent as in the liver.

There is a condition that I think should not be confused with this, that is pylephlebitis, in which there is a very generalized infection in the liver and where multiple abscesses occur. It is hard to believe that these solitary abscesses that we have called in this hospital subphrenic or subdiaphragmatic abscesses are all originally pylephlebitis, but some authorities go so far as to say that they are.

The mortality is very high. The average of all the cases that have been reported up to date is about 55 per cent. mortality.

The type of operation that is done has been until recently a two stage procedure which carries us through the lower pleura, first excising the ninth or tenth rib or both, making an effort to get adhesions between the pleura and the diaphragm, and then twenty-four to forty-eight hours later going in and draining the abscess. That has not been altogether satisfactory, and recently the approach has been made by excising the twelfth rib. This makes the operation a little more difficult but certainly makes it very much safer, and when the collection of pus is in the right lobe of the liver or just above it the operation is simple enough. Frequently enough the diagnosis is made and the patient seems to be doing well, holding his own, nothing is done, and the patient recovers. On the other hand occasionally the diagnosis may be made or a suggestive fluid obtained by tap of the lower chest which will confuse the diagnosis, operation is delayed, and finally the abscess ruptures through the diaphragm into the pleural cavity, which adds tremendously to the gravity of the case and to the mortality.

I wonder if Dr. Camp has these X-rays.

Dr. Camp: I do not see anything very remarkable in any of these plates of the chest, one on the 25th of September, the other on the 14th of October. We might say that the markings of the lung roots were slightly increased in prominence, but I do not see anything definite. Of course the fluoroscopic study is more important, to show whether there is any limitation of motion of the diaphragm. Of course fixation and limitation of excursion of the diaphragm, without definite evidence of pathology above, taken in conjunction with suggestive clinical signs, is I think a valuable sign of upper right quadrant disease. I do not believe we have enough in any of these films to make a diagnosis of pathology in the chest. The limitation of motion in the diaphragm is probably all due to something beneath it and it is of very frequent occurrence in subphrenic abscess. We occasionally meet with it in some cases of gallbladder disease.

DIAGNOSIS

Subphrenic abscess following acute appendicitis.

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CARBON MONOXIDE POISONING

The *Industrial Hygiene Bulletin*, published by the New York State Department of Labor, has recently issued an interesting Carbon Monoxide number containing much valuable information concerning this important health hazard. The fact is pointed out by C. T. Graham-Rogers that although plumbism has always been the medical classic of industrial poisoning, carbon monoxide poisoning is becoming a hazard far more grave. Despite this fact, however, and despite the fact that many claims have been made for compensation, there is no provision in the Compensation Law for this form of poisoning.

"Carbon monoxide," according to Carroll M. Salls, in this number of the *Bulletin*, "is formed whenever any carbon containing material is burned in an incomplete supply of air. It is also formed in a large number of industrial processes, such as in steel making, in foundries, about lime-kilns and gas engines, in gas manufacture and in mining. . . . Automobile exhaust gases contain on the average seven per cent. of carbon monoxide." The greater part of the industrial exposure, however, comes from two sources—illuminating gas for heating industrial gas appliances and exhaust gases from internal combustion engines.

The writer goes on to describe an investigation made in a Brooklyn service station with a storage capacity of 80 cars and about 22,000 square feet of floor space given to repair work, the ceiling height being 15 feet. Headaches and illness attributed to the fumes were common.

Blood analysis of four employees by the Sayers-Yant pyrotannic acid method showed two with 10 and two with 15 per cent. CO saturation, the air in the room containing 4 parts per 10,000 of the gas. These tests are interesting in view of the following table by Sayers and Yant.

Symptoms and Percentage of Blood Saturation

No symptoms	0.10
Tightness across forehead; possibly slight headache, dilation of cutaneous blood vessels	10-20
Headache; throbbing in temples	20-30
Severe headache, weakness, dizziness, dimness of vision, nausea and vomiting, collapse	30-40
Same as previous item with more possibility of collapse and syncope, increased respiration and pulse	40-50
Syncope, increased respiration and pulse; coma with intermittent convulsions; Cheyne-Stokes's respiration	50-60
Coma with intermittent convulsions, depressed heart action and respiration, possibly death	60-70
Weak pulse and slowed respiration; respiratory failure and death	70-80

In the concluding article Robert S. McBirney, M.D., of the Bureau of Industrial Hygiene, discusses the medical aspects of carbon monoxide poisoning. The milder types of symptoms are nausea with sometimes vomiting, ringing in the ears, headache accompanied by throbbing in the temple, a sense of pressure in the temples, discomfort in the stomach, weakness in the legs and indifference to movement and sometimes hallucinations, severe headaches and dimness of vision. A cardinal symptom is the indifference to move or get away from the place of illness to a place of fresh air. These symptoms may end in recovery or in coma lasting from a few minutes to several days. Death is probable if the coma lasts for two days or more. The pulse, slow at first, later becomes rapid with a rise in blood pressure and Cheyne-Stokes respiration, twitching of the muscles, rigidity of the long muscles and absence of the deep reflexes may be noted. Sequelae following a severe case of poisoning are, pneumonia; neurosis; insomnia; muscular irritability; neurasthenia; loss of memory; dementia praecox; mania; general paresis and other forms of dementia, recovery from which is usual. Post mortem changes include fatty degeneration in heart, liver, kidneys, vessel walls and other tissues, with minute hemorrhages throughout the brain tissue.

Treatment of acute poisoning consists in a pure atmosphere, artificial respiration and stimulants.

HOMICIDE IN THE UNITED STATES

THE *Statistical Bulletin* of the Metropolitan Life Insurance Company has recently published figures on homicide in the United States that constitute a direct challenge to the legal organization of this enlightened country. During 1925, according to this report, about 10,100 homicides occurred in Continental United States—involving a rate of more than fourteen times that of England and Wales. The city of Chicago alone, with a population of less than 3,000,000, in a recent year had more than twice the number of homicides that occurred in England and Wales with a population of nearly 40,000,000. The homicide rate for the United States is six times that for even Canada, our nearest neighbor.

The Metropolitan Company has now available data on 611 homicides among its policy holders in the years 1922 to 1924, gained through inquiries sent to prosecuting attorneys at least one year after the crime was committed. The subsequent action in these cases is sufficiently interesting to warrant quotation in full.

"In the first place, 86 of these cases were justifiable homicides, where persons were killed by officers of the law while resisting arrest or while in the act of committing crime. This left 525 assailants answerable to the law for taking human life. It developed that 54 assailants committed suicide and 13 died before arraignment. Of the remaining 458 assailants, 84, or 18.3 per cent., had not been apprehended within one year after the crime had been committed! The 374 cases actually apprehended show an interesting after-history at the hands of the law. There were released by magistrates or grand juries, 108 persons against whom no case could be made, and eight were declared insane. There were actually brought to trial 258 cases or 56.3 per cent. out of an original group of 458 living assailants. In 62 cases the defendants were acquitted, and nine cases were still pending one year after the commission of the crime! A verdict of guilty was rendered in 187 cases, of which 170 were sentenced to prison for terms of varying length, eight cases were sentenced to death (seven executed and one case on appeal) and *nine* were released, either on suspended sentence or by being fined!"

Obviously, the reason why the United States suffers from such a high crime rate is because crime can be committed with comparative impunity. In countries where justice is swift and sure, crime is held, relatively speaking, in check. In our country, staggering under a mass of laws, but with inefficient enforcement and faltering and delayed justice, the commission of all crimes, including homicide, has risen to an appalling degree. The question of capital punishment versus imprisonment for murder is not under discussion. It is at least apparent that if homicide is to be held in check the punishment must fit the crime; it must be sure and it must be swift.

DIAGNOSTIC STANDARDS OF THE NATIONAL TUBERCULOSIS ASSOCIATION

UNDER this title the National Tuberculosis Association has published a pamphlet setting forth the facts to be considered in cases which may present indications of Pulmonary and Glandular Tuberculosis. Early in 1917 a committee was appointed by the President of the National Tuberculosis Association on Diagnostic Standards. Six editions have been published and the last one brought up to date, is ready for distribution. All general practitioners should read this pamphlet. Very few cases of incipient tuberculosis will be ignored by those doctors who study this publication and apply the information contained therein and readers will be led to a careful oversight of cases which should be kept under observation.

This booklet is probably one of the most concise and comprehensive treatises on the common forms of tuberculosis ever published. Copies may be secured free of charge by any physician on request to his state tuberculosis or public health association.

Requests to the National Tuberculosis Association at 370 Seventh Avenue, New York City, will be transmitted in turn to the several state associations. Cordial and painstaking co-operation by the profession will be followed by another step in the progress now in evidence in the reduction of illness and deaths due to tuberculosis.

THIS WEEK'S ISSUE

CONTAINS articles by the following named authors:

PAINTER, CHARLES F., A.B., M.D. Harvard Medical School 1895; Professor of the History of Medicine, Tufts College Medical School; Associate in the Graduate Department of Orthopedics at the Harvard Medical School. His address is 520 Commonwealth Ave. His subject is "Educational Requirements for the Twentieth Century," page 1057.

RICHARDSON, EDWARD P., A.B., M.D. Harvard Medical School 1906; F.A.C.S.; Member, N. E. Surgical Society; Associate Professor of Surgery, Harvard Medical School; Chief, West Surgical Service, Massachusetts General Hospital. His subject is "The Value of Iodine in the Surgical Treatment of Exophthalmic Goitre," page 1066. His address is Massachusetts General Hospital.

WARREN, STAFFORD L., M.D. University of California Medical School 1922; Formerly Intern at Massachusetts General Hospital. His

subject is "A Rare Tumor of the Liver with Metastases in the Heart and Peritoneum," page 1071. His address is Strong Memorial Hospital, Rochester, N. Y.

Burnett, Francis L., S.B.; A.B.; M.D. Harvard Medical School 1906; Graduate Assistant in Skin Department, Massachusetts General Hospital; Instructor of Nutrition, Forsyth Dental Infirmary. He writes on "The Progress of Nutrition," page 1076. His address is 205 Beacon St., Boston.

MISCELLANY

AVOIDING RABIES

Dogs in some portions of the state are now under quarantine as a measure to prevent the spread of rabies among animals. If it is important to prevent rabies among dogs it is all the more important to prevent rabies among humans. As rabies is always fatal when symptoms of the disease once develop, protection against it must be by prevention. There is no hope of curing the disease when it occurs.

Beware of Stray Dogs. Certain precautions should be taken to avoid exposure to rabies. One is to beware of stray dogs. Rabid dogs wander away from home during the excited stage of the disease and often travel for long distances. A stray dog that appears in the neighborhood may be a rabid dog during the excited stage when it is most dangerous. Stray dogs should be impounded in some safe place where they have proper care until their owners can be located.

Do Not Fondle Sick Animals. Another precaution would be not to fondle sick animals. When it is necessary to handle sick dogs or other animals where rabies may be suspected gloves should be worn to protect the hands from the animal's saliva. Many persons are exposed to rabies by getting saliva on the hands without being bitten. The virus is present in the saliva and may enter the body through a cut or abrasion.

Pen Up Sick Animal. A sick dog should be penned up and watched for further symptoms. If the dog really has rabies, symptoms will soon develop so that a veterinarian will have little trouble in making a diagnosis. When the dog is killed at once upon suspicion of the disease it may be too early to find laboratory evidence of rabies. In that case a negative report would give a false sense of security. Upon penning up a sick dog, the health officer and dog warden should be notified.

Take Anti-Rabic Treatment. Any person bitten by a rabid dog, or exposed to rabies by handling the dog, should take anti-rabic (Pasteur) treatment. If uncertain as to whether or not the dog actually has rabies, the animal may be penned up for ten days' observation. Failure of the dog to show evidence of rabies within ten days shows that he did not have rabies at the start. If the wounds made by a dog bite are about the face or head, treatment should begin at once in case rabies is suspected.

If an effort has been made to cleanse the wound or cauterize it this does not remove the necessity of taking the anti-rabic (Pasteur) treatment to prevent rabies and cauterization may disfigure the patient. The only safe treatment after being bitten by a rabid animal or other animal suspected of being rabid, is to take the anti-rabic Pasteur treatment.

Disinfection of Premises After Rabies. The virus of rabies is known to be present in the saliva, urine and milk of infected animals. Thus any of these secretions may distribute rabic virus which would probably be destroyed by drying at room temperature for a week or two, or for a shorter time in direct sunlight. Rabic virus is resistant to antiseptics, especially to the carbolic acid group. In fact the virus will live for days in 5 per cent phenol. If it is desired to use a disinfectant, five per cent formalin is probably as good as any liquid preparation readily available. Fumigation is not advised. Greater dependence should be placed upon mechanical cleansing with hot water and soap than upon the use of any disinfectant.

Vaccination of Dogs. Dogs may be protected from rabies by inoculation with anti-rabic virus. Dog owners are advised to see their veterinarians and have this treatment given.—*Bulletin Connecticut State Department of Health.*

NOTES FROM THE APRIL-MAY BULLETIN OF THE NATIONAL BOARD DIPLOMATES

DIPLOMATES HOLD MEETING IN DALLAS

The Associated Diplomates of the National Board met in Dallas, Texas, during the week of the session of the American Medical Association. The principal action taken at this meeting was the formal adoption of the constitution and the by-laws of the association. The question of the selection of a suitable emblem of membership was referred back to the officers of the association. In addition to the diplomates, there were also present Dr. H. D. Arnold, President of the National Board of Medical Examinations, Dr. M. W. Ireland, Surgeon-General of the United States Army, Dr. Walter L. Bierring, Secretary of the Federation of State Medical Boards, and Everett S. Elwood, Director of the National Board.

DOUBLE HONORS

Five candidates on the honor list for Part II in February have previously won places on the honor list for Part I. They are as follows:

Dr. Max Davis, Dr. Philip G. McLellan, and

Dr. George M. Saunders were graduated from Harvard in 1925. Dr. Davis won eighth place in Part I in June, 1925, and first place in Part II in February, 1926. Dr. McLellan won second place in Part I in February, 1925, and sixth place in Part II in February, 1926. Dr. Saunders won fifth place in Part I in February, 1925, and second place in Part II in February, 1926.

Dr. Harriet G. Guild, who was graduated from the Johns Hopkins University School of Medicine in 1925, won third place in June, 1923, and third place in February, 1926.

Dr. John F. Lecocq, who was graduated from the University of Oregon Medical School in 1925, won fourth place in June, 1925, and sixth place in February, 1926.

PART III IN BOSTON

Twenty-one candidates were examined by the Subsidiary Board of Boston in Part III, April 5, 6, 7 and 8. Twenty of the candidates were successful in securing passing grades, and will therefore receive the certificate of the National Board.

The chairman of the Subsidiary Board is Dr. H. D. Arnold. The chief associate examiners are: Dr. Joseph C. Aub, Dr. A. S. Begg, Dr. Harold Bowditch, Dr. Walter P. Bowers, Dr. H. A. Christian, Dr. Eugene A. Crockett, Dr. Cecil K. Drinker, Dr. Otto Folin, Dr. William P. Graves, Dr. Allen Greenwood, Dr. Worth Hale, Dr. Reid Hunt, Dr. Timothy Leary, Dr. Frank B. Mallory, Dr. Harris P. Mosher, Dr. Franklin S. Newell, Dr. Charles A. Porter, Dr. M. Victor Safford, Dr. Harvey P. Towle, Dr. Hans Zinsser.

Dr. Harold Bowditch is secretary of the Boston Board.

The names of the new Diplomates and their medical schools are as follows:

Dr. Fuller Albright, Harvard University Medical School.

Dr. Maine C. Andersen, Harvard University Medical School.

Dr. Thomas H. Argue, Harvard University Medical School.

Dr. Archibald S. Chalfant, Johns Hopkins University School of Medicine.

Dr. Edward M. Cook, Harvard University Medical School.

Dr. Harry L. Denoon, Jr., University of Virginia Department of Medicine.

Dr. Edwin F. Gildea, Harvard University Medical School.

Dr. Plimpton Guptill, Harvard University Medical School.

Dr. Francis T. Hunter, Harvard University Medical School.

Dr. John T. Jenkin, Harvard University Medical School.

Dr. Luther W. Kelly, University of Virginia Department of Medicine.

Dr. Ellen F. Leong, Rush Medical College.

Dr. James C. McCann, Harvard University Medical School.

Dr. Stephen A. Mahoney, Jr., Harvard University Medical School.

Dr. George Preston Nowlin, University of Virginia Department of Medicine.

Dr. Ralph T. Ogden, Harvard University Medical School.

Dr. Terence C. Ryan, Harvard University Medical School.

Dr. Hiram O. Studley, Jr., Harvard University Medical School.

Dr. Ralph W. Walton, Harvard University Medical School.

Dr. Thomas W. Woodman, Rush Medical College.

CONNECTICUT DEPARTMENT OF HEALTH

Morbidity Report for the Week Ending May 22, 1926

Diphtheria	27	Chickenpox	66
Last week	16	Conjunctivitis, infectious	1
Diphtheria bacilli carrier	1	German measles	23
Whooping cough	62	Influenza	4
Last week	54	Mumps	12
Scarlet fever	81	Pneumonia, lobar	32
Last week	95	Septic sore throat	1
Typhoid fever	9	Tuberculosis, pulmonary	50
Last week	0	Tuberculosis, other forms	1
Measles	471	Gonorrhea	57
Last week	522	Syphilis	36
Bronchopneumonia	39		
Cerebrospinal meningitis	2		

Morbidity Report for the Week Ending May 29, 1926

Diphtheria	14	Conjunctivitis, infectious	3
Last week	27	Encephalitis, epidemic	1
Diphtheria bacilli carriers	7	German measles	64
Whooping cough	39	Influenza	7
Last week	62	Mumps	12
Scarlet fever	84	Pneumonia, lobar	33
Last week	81	Tuberculosis, pulmonary	39
Measles	544	Tuberculosis, other forms	12
Last week	471	Gonorrhea	10
Bronchopneumonia	41	Syphilis	17
Cerebrospinal meningitis	1		
Chickenpox	48		

MASSACHUSETTS DEPARTMENT OF PUBLIC HEALTH

Diseases Reported for the Weeks Ending May 15 and May 22, 1926

	May 15	May 22
Actinomycosis	—	1
Anterior poliomyelitis	1	2
Anthrax	1	—
Chickenpox	86	131
Diphtheria	50	51
Dog-bite	19	21
Dysentery	—	1
Encephalitis lethargica	3	1
Epidemic cerebrospinal meningitis	3	2
German measles	331	465
Gonorrhea	88	71
Hookworm	1	—

Influenza	17	14
Measles	732	828
Mumps	147	160
Ophthalmia neonatorum	16	53
Pneumonia, lobar	138	86
Scarlet fever	221	247
Septic sore throat	1	3
Suppurative conjunctivitis	15	10
Syphilis	51	34
Trachoma	1	1
Tuberculosis, pulmonary	114	152
Tuberculosis, other forms	29	10
Tuberculosis, hilum	56	9
Typhoid fever	8	7
Whooping cough	290	243

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NOTICES

SUMMER COURSES IN BIOLOGY AND PUBLIC HEALTH

Massachusetts Institute of Technology has recently announced summer courses in biology, public health and health education.

Five courses are offered during the summer session which opens July 6 and extends through August 17. These include, "Methods of Teaching General Biology," "General Bacteriology," "Health Education Methods," "Health Records and Statistical Procedure" and "Public Health Laboratory Methods."

For those who would extend and enrich their public health background in order to meet field problems more efficiently, such courses in public health offer a splendid opportunity.

Such supplementary yet fundamental public health courses are on the increase and it is now possible each year to take advantage of like training in different parts of the country at points most convenient to field workers.—*Bulletin Connecticut Department of Health.*

NOTICE OF EXAMINATION FOR ENTRANCE INTO THE REGULAR CORPS OF THE UNITED STATES PUBLIC HEALTH SERVICE

Examinations of candidates for entrance into the Regular Corps of the United States Public Health Service will be held at the following named places on the dates specified:

At Washington, D. C.	July 12, 1926
At Chicago, Ill.	July 12, 1926
At New Orleans, La.	July 12, 1926
At San Francisco, Calif.	July 12, 1926

Candidates must be not less than 23 nor more than 32 years of age, and they must have been graduated in medicine at some reputable medical college, and have had one year's hospital experience or two years' professional practice. They must pass satisfactorily oral, written and clinical tests before a board of medical officers and undergo a physical examination.

Successful candidates will be recommended for appointment by the President, with the advice and consent of the Senate.

Requests for information or permission to take this examination should be addressed to the Surgeon-General, United States Public Health Service, Washington, D. C.

S. B. Grubbs, *Acting Surgeon-General.*

UNITED STATES CIVIL SERVICE EXAMINATION

The United States Civil Service Commission announces the following open competitive examination:

Junior Medical Officer (Interne)

Applications for junior medical officer will be rated as received until August 31. The examination is to fill vacancies in Veterans' Bureau Hospitals and Diagnostic Centres, and in positions requiring similar qualifications.

The entrance salary for this position in the field service of the Veterans' Bureau is $1860 to $2400 a year without allowances, or $1260 to $1860 a year with quarters, subsistence and laundry, the entrance salary within the range stated depending upon the qualifications of the appointee as shown in the examination and the duty to which assigned. Those who show only the minimum qualifications for admission to the examniation will be eligible for appointment at the minimum salary only. To those whose services are satisfactory, and in the discretion of the appointing officer there may be granted a salary increase of not more than $600 a year at the end of the six months' probationary period required by the civil service rules, and at the end of 18 months the salary of $3300 a year, without allowances, may be paid in the discretion of the appointing officer and subject to the existence of vacancies.

The duties, under immediate supervision, are to admit patients, take histories, make physical and mental examinations and record findings; to make ward rounds of inspection, note charts, record observations; to prescribe for minor ailments or for acute or emergency cases and to dispense medicine in emergency; to perform minor surgical operations and to assist at major operations and in redressing; to administer anesthetics; to make routine laboratory tests and analyses; to assist at out-patient clinics in dressing and in administering vaccines; to keep records, make up case histories, answer correspondence relating to patients and compile statistics requiring medical training.

Full information and application blanks may be obtained from the United States Civil Service Commission, Washington, D. C., or the secretary of the Board of United States Civil Service Examiners at the postoffice or custom house in any city.

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REPORTS AND NOTICES OF MEETINGS

NORTH SHORE MEDICAL FRATERNITY

At a meeting of the North Shore Medical Fraternity held at Lynn, Mass., on Tuesday evening, April 20, Dr. William D. McFee of Haverhill read a paper on the Uses of Physio-Therapy in General Practice. His paper was followed by Lantern Slides, offered through the courtesy of the General X-ray company of Boston.

On Tuesday evening, May 20, the North Shore Medical Fraternity was addressed by Dr. Joseph Skirball of Boston who read a very interesting paper on Some of the Common Eye Conditions as seen by the General Practitioner. His talk was illustrated with lantern slides. A dinner at Huntt's Grill preceded the meeting.